SOIL SURVEY OF

Carson City Area, Nevada

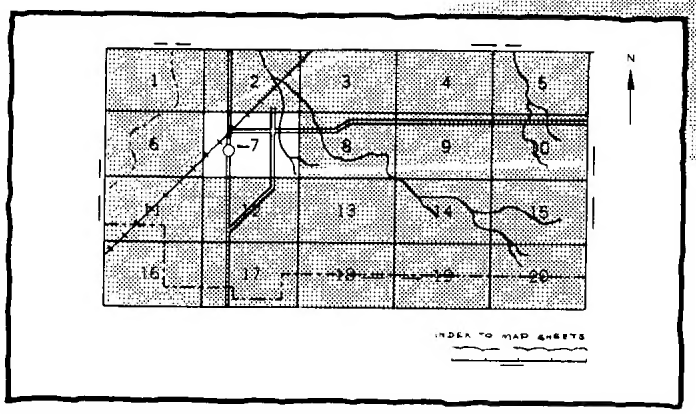
United States Department of Agriculture
Soil Conservation Service and Forest Service

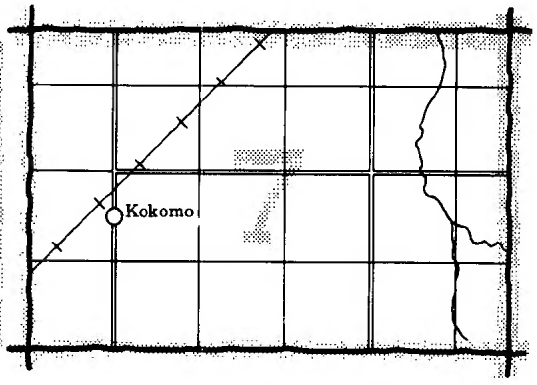
in cooperation with

Nevada Agricultural Experiment Station
and United States Department of the Interior
Bureau of Land Management and Bureau of Indian Affairs

HOW TO USE

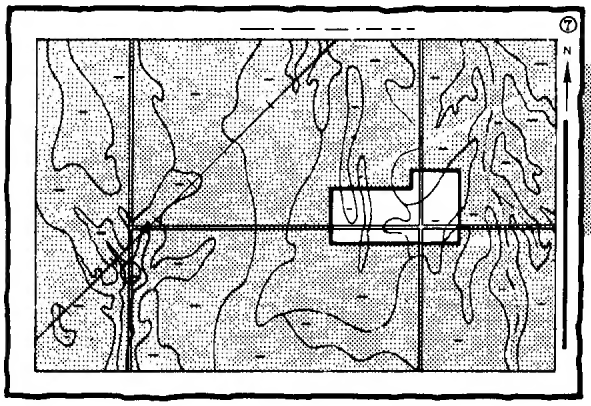
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

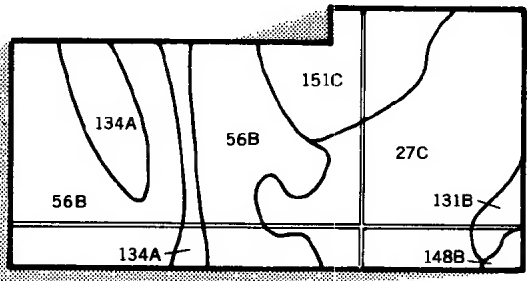




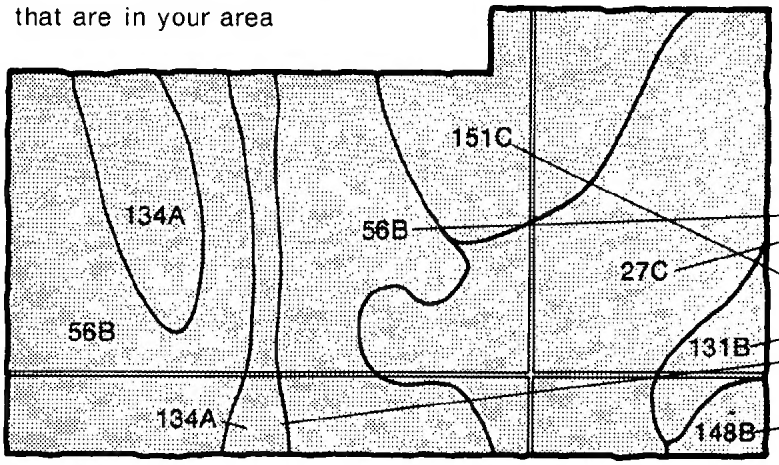
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

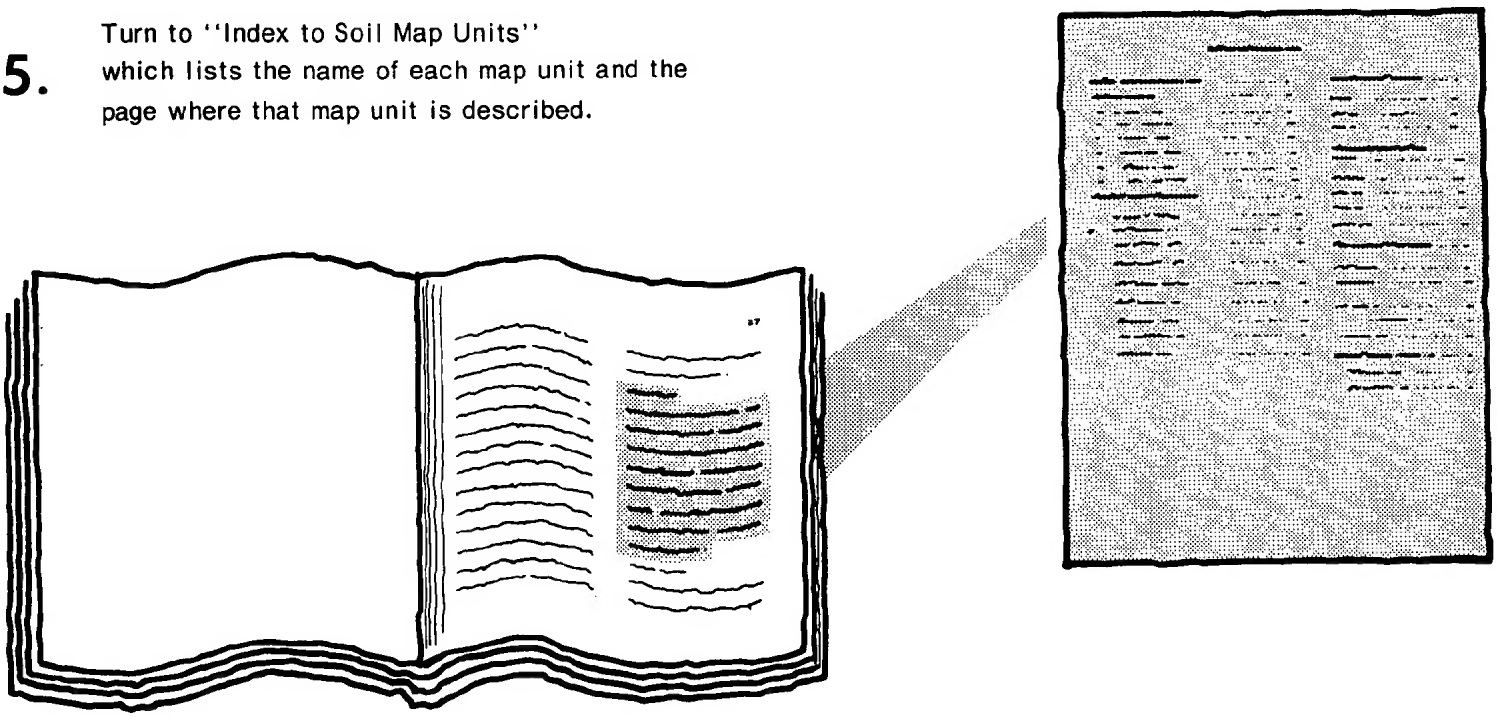


Symbols

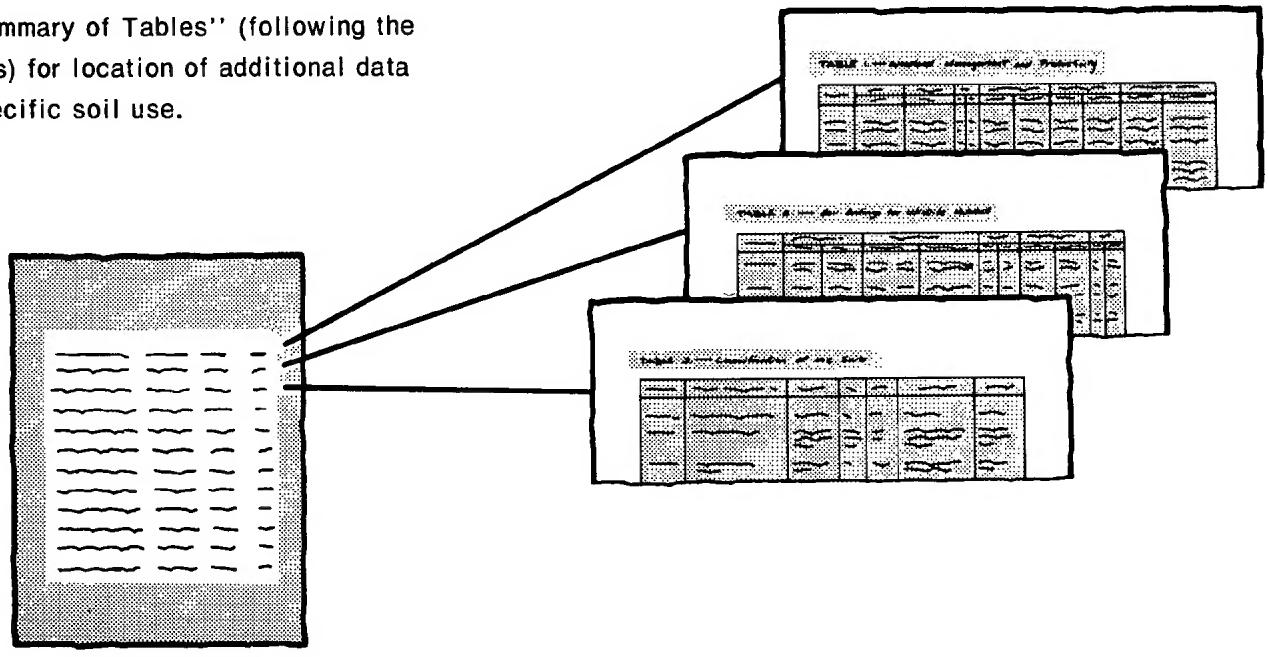
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1972-74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1974. This survey was made cooperatively by the Soil Conservation Service and the Forest Service, the Nevada Agricultural Experiment Station, and the Department of the Interior, the Bureau of Land Management and the Bureau of Indian Affairs. It is part of the technical assistance furnished to the Carson Valley Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Contents

Contents—Continued

Issued August 1979

Index to soil map units

Index to soil map units—Continued

Summary of Tables

Summary of Tables—Continued

Foreword

The Soil Survey of Carson City Area, Nevada, contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

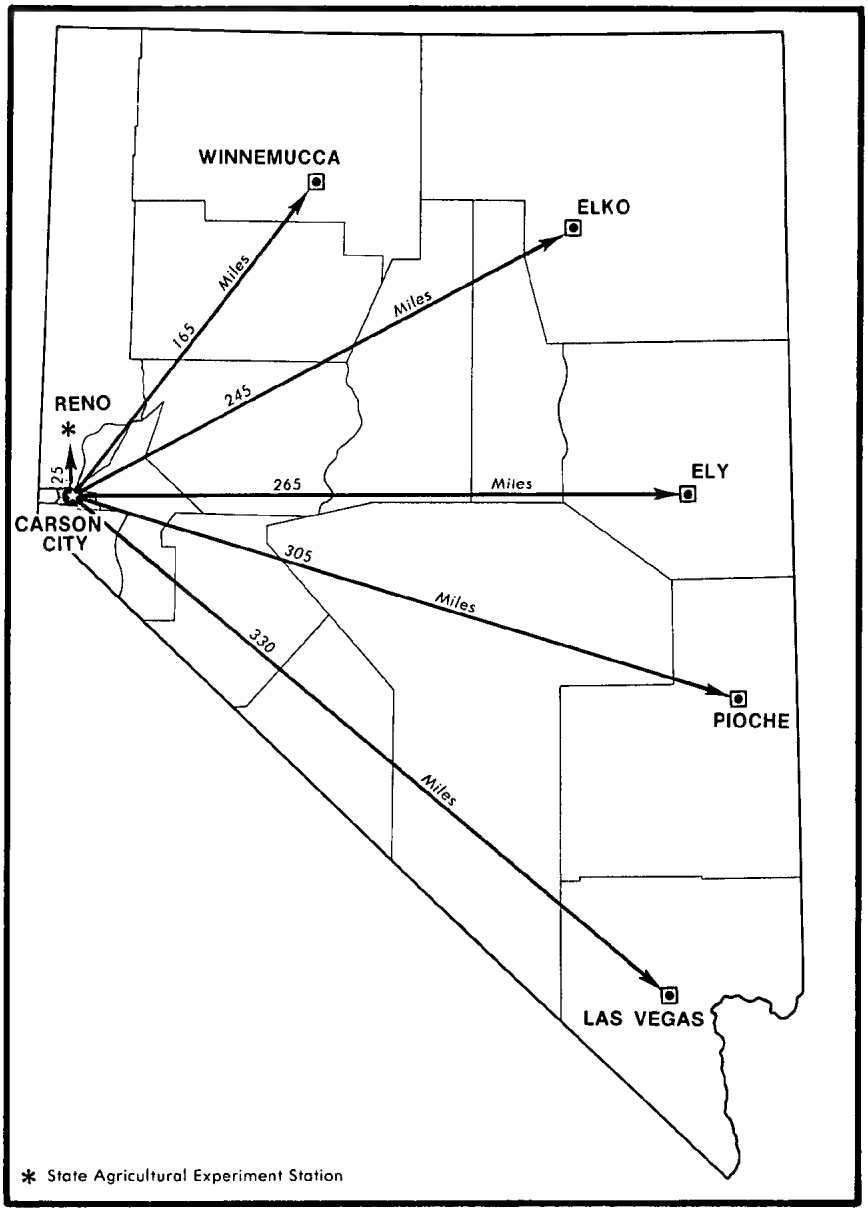
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Gerald C. Thola
State Conservationist
Soil Conservation Service



Location of Carson City Area in Nevada.

SOIL SURVEY OF CARSON CITY AREA, NEVADA

By David M. Candland, Soil Conservation Service

Fieldwork by David M. Candland, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
and Forest Service, in cooperation with Nevada Agricultural Experiment
Station and United States Department of the Interior, Bureau of Land
Management and Bureau of Indian Affairs

CARSON CITY AREA is in the west-central part of Nevada (see map on facing page). It has an area of 85,144 acres, or about 133 square miles. Carson City, the capital of Nevada, is the principal city in the Area.

The survey area is bounded on the northwest and north by Washoe County, to a point of junction with Storey County; on the northeast and east by Lyon County; on the south by Douglas County; and on the west by the watershed divide on the Carson Range of the Sierra Nevada.

About 57 percent of the survey area is privately or municipally owned. Of the remaining acreage, about 35 percent is administered by the Bureau of Land Management, 5 percent by the Toiyabe National Forest, and 3 percent by the Bureau of Indian Affairs.

General nature of the area

This section is primarily for those who are not familiar with the survey area. It briefly discusses settlement and development, farming and ranching, transportation, water supply, physiography and geology, and climate.

Settlement and development

Carson City Area was first explored in 1844 by John Fremont and "Kit" Carson (*3*). A little later trappers, explorers, and settlers on their way to California came into the Area. Some came in search of a new transcontinental route, and others came in search of gold and game. The great migration of 1849 found the Area still a wilderness. In November 1851, a party of settlers, led by Adam Curry, was attracted to the Area for purposes of trading and farming. They settled in what is the present site of Carson City.

In 1859 the Comstock lode was discovered. Shortly afterward, Carson City became a hub of activity. Miners and loggers on their way to and from Virginia City, the site of the Comstock find, made Carson City an important center. The railroad played a major part in the development of Carson City, which at one time had the largest repair and maintenance shop in the West. Farmers and ranchers in the Area found a ready market for their produce.

As mining in the Virginia City area continued to expand, the demand increased for mine timber, lumber for new buildings, and wood for heating and cooking. Most of the timber came from the Carson Range of the Sierra Nevada, but some singleleaf pinyon and Utah juniper came from the Virginia and Pine Nut Ranges. Stumps and shallow roots were dug and used for firewood. The most accessible trees were cut first; but the hauling distance increased as the demand for timber increased, and soon logging was common in the Lake Tahoe Basin.

Carson City was the capital of the territory. In 1864 Nevada was admitted to the Union and Carson City became the capital. Farming and ranching grew, but only to the extent that available water would permit. The population of the area increased from 2,453 in 1920 to 15,468 in 1970. Most of this growth was accompanied by a decline in farming and ranching. Carson City now covers most of the area that once was farmed.

The economic base for the Area now depends on industries associated with the State and Federal governments and tourist attractions. Most of the work force is employed by agencies of the governments (*3*). There is some light industrial and warehousing activity in the Area.

Another governmental authority operating within the Area is the Nevada Indian Agency of the Bureau of Indian Affairs. The Agency administers the Stewart Indian School. Both academic and vocational programs are provided for the students. Students are enrolled from tribes in five States. They attend grades seven through twelve. The Agency also has trust responsibility for the Indian colonies and reservations in Nevada.

Farming and ranching

Rapid expansion of urban and commercial uses of the soils suitable for irrigated farming has resulted in a decline of farming during the past decade. In 1973 about 2,500 acres, or 2.9 percent of the survey area, was used

for irrigated crops, hay, and pasture. About 94 percent of the Area is used for rangeland, woodland, recreation, wildlife habitat, and watershed. About 3.5 percent of the Area is urban land.

Transportation

U.S. Highway 50 passes through the Area from east to west, and U.S. Highway 395 passes through from north to south. The local road system is mainly graded gravel or dirt roads maintained by Carson City. Outlying roads commonly are unsurfaced and are poorly maintained.

Railroad service is available in Reno, which is served by the Southern Pacific and Western Pacific Railroads, and in Fallon, which is also served by the Southern Pacific Railroad. Railroads do not pass directly through the Carson City area, but three bus companies provide service to the Area on a regular schedule. Also, the well maintained Carson City Airport provides air transportation via small aircraft.

Water supply

The water supply in the Area is very limited, and its use for the production of crops is subordinate to municipal and domestic uses. The Area has been declared a critical ground water basin by the State engineer. Most of the domestic water comes from ground water sources and is supplemented by water from two lakes high in the Carson Range. The present water supplies will soon be inadequate unless additional sources of water are developed.

Physiography and geology

The Carson City Area is at an elevation of about 4,600 feet. The Carson Range, a part of the Sierra Nevada to the west, rises abruptly from the valley floor and reaches an elevation of 9,214 feet. The Pine Nut Range, which is east of the valley, reaches an elevation of 7,629 feet. The Virginia Range, on the north side, reaches an elevation of 5,297 feet. The low divide that separates Carson City from Douglas County on the south reaches an elevation of about 5,000 feet.

Carson River enters Eagle Valley about midway along the southern boundary of the Area and flows north-northeast. Clear Creek, which drains the southern part of the Carson Range, flows most of the year. Other drainageways from the Carson Range are King, Ash, Vicee, and Combs Canyons. Brunswick Canyon and Eldorado Canyon drain most of the Pine Nut Range, but water flows only during periods of runoff and flooding in spring.

Carson City Area is within the Basin and Range province (*5*). The mountain ranges are bounded by basin-range faults. The Carson, Pine Nut, and Virginia Ranges are north-trending spurs of the Sierra Nevada. They make up two master fault-block ranges. The Pine Nut and Virginia Ranges are tilted to the west.

Three major kinds of bedrock are in the area: sedimentary and metasedimentary, volcanic and metavolcanic, and igneous intrusive. The smallest body of bedrock is the sedimentary and metasedimentary unit, which lies west of and parallel to the Carson River and extends south of the junction of Brunswick Canyon and the Carson River to the Douglas County line. It consists of shale, slate, tuffaceous siltstone, sandstone, and graywacke derived largely from volcanic rocks. This rock is of Mesozoic age, late Jurassic or early Triassic.

Volcanic and metavolcanic rocks of Tertiary and Mesozoic age occur extensively in upland areas. Metavolcanic rock underlies a triangular area that extends west from the north part of Voltaire Canyon and Ash Canyon nearly to the divide of the Carson Range. This unit also crops out in a large area in the Pine Nut Range. From about midway through Brunswick Canyon, this area extends south to the Douglas County line. A small area of outcrop also occurs in the northern half of the Prison Hills. This rock is of Triassic and Jurassic age. Rocks in these areas are primarily metamorphosed andesitic breccia and lesser amounts of rhyolite and basalt. The largest body of Tertiary volcanic rock encompasses the Virginia Range and most of the Pine Nut Range. The rock is flow breccia, lava flow, and agglomerates with interbedded sediment. It includes basalt, rhyolite, and some andesitic varieties.

The igneous intrusive rock of the Carson Range is of Cretaceous age. The rock is granitic and is dominantly quartz, monzonite, and granodiorite. Granitic rock also crops out in the southern half of the Prison Hills. A small outcrop occurs west of Sullivan Canyon in the Pine Nut Range.

Eagle Valley and a small area near the head of Brunswick Canyon are underlain by Quaternary basin-fill deposits. These include alluvium from flanking mountains and fluvial deposits of the Carson River. Small bodies of alluvium are scattered throughout the Area.

Climate

In the Carson City Area summers are warm, especially at lower elevations, and winters are cool. At lower elevations, precipitation is normally light throughout the year and the soils are mainly used for range. At higher elevations, precipitation is much greater and snow accumulates to a considerable depth. Much of the snowmelt is used to irrigate crops in nearby valleys.

Table 1 gives data on temperature and precipitation in the survey area, as recorded at Carson City for the period 1951-73. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 35.2 degrees F and the average daily low is 21.8 degrees. The lowest temperature on record, -18 degrees, occurred at Carson City on December 11, 1972. In summer, the average temperature is 66.7 degrees and the average daily high is 85.4

degrees. The highest temperature, 103 degrees, was recorded on July 19, 1960.

Growing degree days, given in table 1, are equivalent to "heat units." Beginning in spring, growing degree days accumulate by the amount that the average temperature each day exceeds the base temperature of 40 degrees. The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 2.64 inches, or 24 percent, usually falls during the period April through September, which includes the growing season for most crops. Two years in ten, the rainfall from April through September is less than 1.25 inches. The heaviest 1-day rainfall during the period of record was 3.03 inches at Carson City on February 1, 1963. About 13 thunderstorms occur each year. Nine of these occur in summer.

Average seasonal snowfall is 30 inches. The greatest depth of snow at any one time during the period of record was 15 inches. On the average, 8 days have at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon in spring is less than 28 percent; during the rest of the year it is about 33 percent. Humidity is higher at night in all seasons, and the average at dawn is about 60 percent. The percentage of possible sunshine is 90 percent in summer and 60 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 8 miles per hour, in April.

Every few years a blizzard accompanied by high winds and much drifting snow strikes the survey area. Even at lower elevations, snow remains on the ground for many weeks and livestock suffer.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for select-

ing a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The general soil map at the back of this survey dot not join, in all instances, with the general soil maps for adjacent survey areas. Differences in the maps have resulted from differences in the occurrence of soil patterns, differences in the publication scale of the maps, and the recent advances in classification. The 11 map units in this survey have been grouped into four general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

Strongly sloping to very steep soils of the Sierra Nevada

These soils are on east-facing side slopes of the Carson Range. Elevation ranges from about 6,000 feet to about 9,000 feet. The average annual precipitation is 20 to 45 inches, most of which falls as snow in winter. The average annual air temperature is 35 to 45 degrees F, and the frost-free season is less than 75 days.

These soils are shallow to deep and well drained to excessively drained. They formed in residuum and colluvium from granitic and metavolcanic rock. The surface layer is nongravelly, gravelly, stony, or bouldery and is medium textured to coarse textured.

These soils are used for livestock grazing, wildlife habitat, limited commercial woodland, and watershed.

The native vegetation is mainly California red fir and Jeffrey pine. Where the tree canopy is open, these soils commonly have an understory of big sagebrush, antelope bitterbrush, pinemat manzanita, needlegrass, and squirreltail.

Three map units are in this group. They make up about 18 percent of the survey area.

1. Cagwin-Toem

Moderately steep to very steep, somewhat excessively drained and excessively drained, shallow and moderately deep soils that have a surface layer of gravelly sand and bouldery coarse sand

This map unit is on long, east-facing side slopes of the Carson Range of the Sierra Nevada. The soils in this unit formed in residuum and colluvium from granitic rock. Elevation ranges from about 7,500 to 9,000 feet. The average annual precipitation is 35 to 45 inches, most of which falls as snow in winter. The average annual air temperature is 36 to 40 degrees F, and the frost-free season is less than 45 days.

This unit makes up 4 percent of the survey area. It is about 62 percent Cagwin soils and 23 percent Toem soils. The remaining 15 percent is a soil that is similar to Cagwin soils but is deep and has outcrops of granitic rock.

Cagwin soils are moderately deep and somewhat excessively drained. The surface layer is gravelly sand about 7 inches thick. The next layer is gravelly coarse sand or gravelly sand about 33 inches thick. Granitic bedrock is at a depth of 40 inches.

Toem soils are shallow and excessively drained. The surface layer is bouldery coarse sand about 7 inches thick. The next layer is gravelly coarse sand or gravelly loamy coarse sand and loamy coarse sand about 10 inches thick. Granitic bedrock is at a depth of 17 inches.

This unit is used for limited livestock grazing, wildlife habitat, limited woodland, and watershed.

The native vegetation consists of California red fir and an understory of big sagebrush, pinemat manzanita, Thurber needlegrass, and squirreltail. Where the tree canopy is closed, there is very little understory vegetation.

This unit is limited for livestock grazing and commercial woodland. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

The unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, or recreational development.

2. Corbett-Toiyabe

Strongly sloping to very steep, somewhat excessively drained and excessively drained, shallow and moderately deep soils that have a surface layer of stony loamy coarse sand and gravelly sand

This map unit is on the long, east-facing side slopes of the Carson Range. The soils in this unit formed in residuum and colluvium from granitic rock. Elevation ranges from about 6,000 to 7,500 feet. The average annual precipitation is 20 to 45 inches, most of which falls as snow in winter. The average annual air temperature is 37 to 45 degrees F, and the frost-free season is 45 to 75 days.

This unit makes up 9 percent of the survey area. It is about 46 percent Corbett soils and about 36 percent Toiyabe soils. The remaining 18 percent is Tarloc Variant soils and some areas of deep sandy soils that are underlain by granitic bedrock and have outcrops of granitic rock.

Corbett soils are moderately deep and somewhat excessively drained. The surface layer is gravelly sand or stony loamy coarse sand about 8 inches thick. The next layer is gravelly loamy coarse sand about 32 inches thick. Granitic bedrock is at a depth of 40 inches.

Toiyabe soils are shallow and excessively drained. The surface layer is stony loamy coarse sand about 4 inches thick. The next layer is gravelly coarse sand or gravelly loamy coarse sand about 7 inches thick. Granitic bedrock is at a depth of 11 inches.

This unit is used for limited livestock grazing, wildlife habitat, limited woodland, and watershed.

The native vegetation consists of Jeffrey pine and an understory of big sagebrush, antelope bitterbrush, snowberry, pinemat manzanita, and needlegrasses. Where the tree canopy is closed, there is very little understory vegetation.

This unit is limited for livestock grazing and commercial woodland. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, or recreational development. Some of the less sloping areas can be used for these purposes if special care is taken in design. Depth to bedrock and steepness of slope are the major limitations. Housing pads, roads, and sewage systems may require special design and protection.

3. Vicee-Arkson-Rock outcrop

Steep and very steep, well drained, deep soils that have a surface layer of very fine sandy loam and stony very fine sandy loam, and Rock outcrop

This map unit is on long, east-facing side slopes of the Carson Range of the Sierra Nevada. The soils formed in colluvium from metavolcanic rock. Elevation ranges from about 6,500 to 9,000 feet. The average annual precipitation is 20 to 40 inches, most of which falls as snow in winter. The average annual air temperature is 40 to 45 degrees F, and the frost-free season is less than 75 days.

This unit makes up 5 percent of the survey area. It is about 39 percent Vicee soils, about 21 percent Arkson soils, and 20 percent Rock outcrop. The remaining 20 percent is Aldax Variant soils, some areas of soils that are similar to Vicee and Arkson soils but are moderately deep, and a deep soil that has a subsoil of clay loam.

Vicee soils are deep and well drained. They are overlain by a layer of duff about 1 inch thick. The surface layer is very fine sandy loam about 7 inches thick. The next layer is very fine sandy loam about 39 inches thick. Metavolcanic bedrock is at a depth of 46 inches.

Arkson soils are deep and well drained. The surface layer is stony very fine sandy loam about 3 inches thick. The next layer is gravelly very fine sandy loam about 37 inches thick. Below this to a depth of 60 inches is very gravelly very fine sandy loam.

Rock outcrop consists of barren exposures of weathered metavolcanic rock and is scattered throughout areas of Vicee and Arkson soils. It occurs mainly along the ridges and as vertical dikes on slopes.

This unit is used for livestock grazing, woodland, wildlife habitat, and watershed.

The native vegetation consists mainly of Jeffrey pine and lodgepole pine and an understory of big sagebrush, antelope bitterbrush, Thurber needlegrass, Nevada bluegrass, longleaf phlox, and pinemat manzanita. Where the tree canopy is closed, the understory vegetation is greatly reduced.

This unit is limited for livestock grazing by steep and very steep slopes and the stony and medium textured surface layer. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This association is poorly suited to community development, sanitary facilities, and recreational development.

Moderately sloping to very steep soils of the Pine Nut and Virginia Ranges

The soils in this group are on the Pine Nut and Virginia Ranges, Hot Spring Mountain, Prison Hill, and the foothills to the south and west of Carson City. Elevation ranges from about 4,700 feet to 6,800 feet. The average annual precipitation is 10 to 16 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free season is 80 to 110 days.

The soils are shallow to deep and well drained to somewhat excessively drained. They formed in residuum and colluvium from basalt, andesite, and metavolcanic rock. The surface layer is very cobbly, very stony, extremely stony, very gravelly, and gravelly. It is moderately fine textured to coarse textured.

These soils are used for livestock grazing, wildlife habitat, some noncommercial woodland, and watershed.

The native vegetation is mainly pinyon and juniper and an understory of big sagebrush, antelope bitterbrush, needlegrasses, and squirreltail. Where the tree canopy is closed, the understory vegetation is greatly reduced.

Five map units are in this group. They make up about 54 percent of the survey area.

4. Cagle-Nosrac

Moderately steep and steep, well drained, moderately deep and deep soils that have a surface layer of stony clay loam and very stony clay loam

This map unit is on long, north- and south-facing side slopes of the Pine Nut Range. The soils in this unit formed in colluvium and residuum from andesite. Elevation ranges from about 5,800 to 6,800 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 45 to 50 degrees F, and the frost-free season is 80 to 110 days.

This unit makes up about 6 percent of the survey area. It is about 60 percent Cagle soils and 25 percent Nosrac soils. The remaining 15 percent is Deven and Oppio soils and some small areas of Holbrook Variant soils and Rock outcrop.

The Cagle soils are moderately deep and well drained. The surface layer is very stony clay loam about 2 inches thick. The next layer is clay and gravelly clay about 15 inches thick. Below this is very gravelly clay about 13 inches thick. Andesitic bedrock is at a depth of 30 inches.

The Nosrac soils are deep and well drained. The surface layer is stony clay loam about 9 inches thick. The next layer is very gravelly clay loam about 25 inches thick. Below this to a depth of 60 inches is very gravelly loam.

This unit is used for livestock grazing, wildlife habitat, and watershed.

The native vegetation is singleleaf pinyon and Utah juniper and an understory of big sagebrush, antelope bitterbrush, and squirreltail. Where the tree canopy is closed, the understory vegetation is greatly reduced.

This unit is limited for livestock grazing by the moderately steep and steep slopes and the stony and very stony surface. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, and recreational development.

5. Koontz-Sutro

Moderately steep and steep, well drained, shallow and moderately deep soils that have a surface layer of very stony loam and very gravelly loam

This map unit is on short, west- and south-facing side slopes of the Pine Nut Range and the foothills to the south and west of Carson City. The soils formed in residuum from metavolcanic rock. Elevation ranges from about 5,000 to 6,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 52 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 12 percent of the survey area. It is about 62 percent Koontz soils and 20 percent Sutro soils. The remaining 18 percent is Aldax, Indiano, Surprise, Haybourne, Sutro Variant, and Indiano Variant soils and Rock outcrop.

Koontz soils are shallow and well drained. The surface layer is very gravelly loam about 9 inches thick. The next layer is very gravelly clay loam about 5 inches thick. Fractured metavolcanic bedrock is at a depth of 14 inches.

Sutro soils are moderately deep and well drained. The surface layer is very stony loam about 6 inches thick. The next layer is gravelly loam about 18 inches thick. Metavolcanic bedrock is at a depth of 24 inches.

This unit is used for livestock grazing, wildlife habitat, noncommercial woodland, and watershed. The Pine Nut Range is commonly a source of firewood, fenceposts, and Christmas trees for local use. Pine nuts are harvested in favorable years.

The native vegetation in the Pine Nut Range is singleleaf pinyon and Utah juniper and an understory of big sagebrush, antelope bitterbrush, and squirreltail. Where the tree canopy is closed, the understory vegetation is greatly reduced. The vegetation in the foothills south and west of Carson City is big sagebrush, antelope bitterbrush, and squirreltail.

This unit is limited for livestock grazing by the moderately steep and steep slopes and the very gravelly and very stony surface. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, or recreational development, because of the moderately steep and steep slopes, the very gravelly and very stony surface layer, and the shallow depth to bedrock.

6. Glenbrook-Tarloc-Rock outcrop

Moderately sloping to very steep, well drained to somewhat excessively drained, shallow to moderately deep soils that have a surface layer of gravelly loamy coarse sand and gravelly coarse sandy loam, and Rock outcrop

This map unit is on short side slopes of the Pine Nut Range, the Virginia Range, the foothills west and south of Carson City, and Prison Hill. The soils formed in residuum and colluvium mostly from granitic rock. Elevation ranges from 4,700 to 6,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 11 percent of the survey area. It is about 54 percent Glenbrook soils, 27 percent Tarloc soils, and 8 percent Rock outcrop. The remaining 11 percent is mainly Mottsville, Surprise, and Incy soils.

Glenbrook soils are shallow and somewhat excessively drained. The surface layer is gravelly loamy coarse sand about 14 inches thick. Granitic rock is at a depth of 14 inches.

Tarloc soils are moderately deep and well drained. The surface layer is gravelly coarse sandy loam about 14 inches thick. Granitic bedrock is at a depth of 22 inches.

Rock outcrop is barren exposures of granitic rock. It is scattered throughout areas of the Glenbrook and Tarloc soils.

This unit is used for livestock grazing, wildlife habitat, and watershed.

The native vegetation is big sagebrush, antelope bitterbrush, Indian ricegrass, squirreltail, and a few scattered singleleaf pinyon and Utah juniper.

This unit is limited for livestock grazing by the moderately steep to very steep slopes, the coarse textured surface layer of the Glenbrook soils, and droughtiness. Suitable management practices are those that help to maintain the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, and recreational development, because

the slopes are moderately steep to very steep and bedrock is at a shallow or moderate depth.

7. Deven-Oppio-Xerta

Moderately sloping to steep, well drained, shallow and moderately deep soils that have a surface layer of very cobbly loam, very stony fine sandy loam, and extremely stony loam

This map unit is on short side slopes of hilly uplands and tablelands of the Pine Nut and the Virginia Ranges. It is characterized by numerous Rock outcrops, basaltic flows, and sharp escarpments. The soils formed in colluvium and residuum mainly from basaltic rock. Elevation ranges from 5,000 to 6,800 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 21 percent of the survey area. It is about 20 percent Deven soils, 12 percent Oppio soils, 11 percent Xerta soils, and 15 percent Rock outcrop. The remaining 42 percent is Hocar, Holbrook Variant, Nosrac, Old Camp, and Reno soils and some small areas of Rubble land.

Deven soils are shallow and well drained. The surface layer is very cobbly loam about 3 inches thick. The next layer is gravelly clay, clay, or clay loam about 6 inches thick. Andesite bedrock is at a depth of 9 inches.

Oppio soils are moderately deep and well drained. The surface layer is very stony fine sandy loam about 6 inches thick. The next layer is very gravelly clay about 21 inches thick. Highly fractured andesitic bedrock is at a depth of 27 inches.

Xerta soils are moderately deep and well drained. The surface layer is extremely stony loam about 10 inches thick. The next layer is clay about 13 inches thick. An indurated hardpan is at a depth of 23 inches.

Rock outcrop consists of barren exposures of basaltic rock that occurs as escarpments and ridges scattered throughout areas of the major soils of this unit.

This unit is used for livestock grazing, wildlife habitat, and watershed.

The native vegetation is big sagebrush, low sagebrush, Thurber needlegrass, desert needlegrass, Sandberg bluegrass, green ephedra, squirreltail, and some scattered singleleaf pinyon and Utah juniper.

This unit is limited for livestock grazing by shallow to moderate depth over bedrock or a hardpan, moderately steep to steep slopes, and a surface layer that is cobbly, very stony, or extremely stony. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

The unit is not suitable for community development, sanitary facilities, or recreational development, because the slopes are moderately steep and steep, the surface layer is very stony, extremely stony, or very cobbly, and the soils are shallow to moderately deep over bedrock or a hardpan.

8. Hocar-Rock outcrop

Moderately steep and steep, well drained, shallow soils that have a surface layer of gravelly loam, and Rock outcrop

The soils in this map unit are on side slopes of the hilly uplands of the Pine Nut Range. It formed in residuum and colluvium from metasedimentary rock. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 4 percent of the survey area. It is about 67 percent Hocar soils and 13 percent Rock outcrop. The remaining 20 percent is Incy soils and a soil that is similar to Hocar soils but is moderately deep and occurs on north-facing side slopes.

Hocar soils are shallow and well drained. The surface layer is gravelly loam about 7 inches thick. The next layer is very gravelly loam about 10 inches thick. Weathered metasedimentary rock is at a depth of about 17 inches.

Rock outcrop is barren exposures of rocky ridges and escarpments that are scattered throughout areas of the Hocar soils. In some places the rock is covered by a few inches of soil material.

This unit is used for livestock grazing, wildlife habitat, and watershed.

The native vegetation is singleleaf pinyon and Utah juniper and an understory of big sagebrush, antelope bitterbrush, green ephedra, and squirreltail.

This unit is limited for livestock grazing by shallow depth, low available water capacity, Rock outcrops, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides limited habitat for many kinds of mammals and birds.

This unit is severely limited for community development, sanitary facilities, and recreational development by moderately steep and steep slopes, rock outcrops, and shallow depth to bedrock.

Nearly level to moderately steep soils on broad alluvial fans

The soils in this group are mainly on the alluvial fans and terraces surrounding Eagle Valley and in an area east of Prison Hill. Elevation ranges from 4,500 to 5,500 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 49 to 52 degrees F, and the frost-free season is 100 to 110 days.

The soils are moderately deep and deep and well drained to excessively drained. They have a moderately coarse textured and coarse textured surface layer. They formed in alluvium from mixed rock sources. Some of the soils formed mainly in material from granitic rock.

These soils are used mainly for livestock grazing and wildlife habitat. Areas of these soils near Carson City are rapidly being urbanized.

The native vegetation is mainly big sagebrush, antelope bitterbrush, Indian ricegrass, needlegrasses, and squirreltail.

Two map units are in this group. They make up about 19 percent of the survey area.

9. Incy-Toll

Nearly level to moderately steep, somewhat excessively drained and excessively drained, deep soils that have a surface layer of fine sand and gravelly loamy sand

This map unit is on smooth alluvial fans and slightly rolling terraces on the east side of Hot Spring Mountain. The soils in this unit formed in loess and alluvium from mixed rock sources. Elevation ranges from 4,500 to 5,500 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 49 to 52 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 4 percent of the survey area. It is about 71 percent Incy soils and 25 percent Toll soils. The remaining 4 percent is small areas of Rock outcrop and some areas of sandy soils that are subject to frequent flooding.

Incy soils are deep and excessively drained. They are fine sand to a depth of 60 inches.

Toll soils are deep and somewhat excessively drained. The surface layer is gravelly loamy sand about 15 inches thick. Below this to a depth of 60 inches is gravelly loamy sand.

This unit is used for livestock grazing and wildlife habitat.

The native vegetation is big sagebrush, antelope bitterbrush, Anderson peachbrush, Indian ricegrass, and squirreltail.

This unit is limited for livestock grazing by the coarse texture and droughtiness of the soil. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is poorly suited to community development, sanitary facilities, and recreational development. It is limited for these uses by coarse texture, seepage in places, and a hazard of soil blowing.

10. Surprise-Haybourne-Prey

Nearly level to strongly sloping, well drained and somewhat excessively drained, moderately deep and deep soils that have a surface layer of gravelly sandy loam, sandy loam, gravelly loamy sand, fine sandy loam, gravelly fine sandy loam, and coarse sandy loam

The soils in this map unit are on alluvial fans and in the northwestern, northeastern, and southern parts of Eagle Valley. The soils formed in alluvium from mixed rock. Elevation ranges from 4,600 to 4,900 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 15 percent of the survey area. It is about 31 percent Surprise soils, 26 percent Haybourne soils, and 11 percent Prey soils. The remaining 32 percent is Dalzell Variant, Fettic Variant, Indiano Variant, McFaul, Jubilee, Reno, and Greenbrae soils.

Surprise soils are deep and well drained. The surface layer is gravelly sandy loam about 7 inches thick. The next layer is stratified coarse sandy loam to gravelly loam about 33 inches thick. Below this to a depth of 60 inches is stratified gravelly loamy sand and gravelly loam.

Haybourne soils are deep and well drained or somewhat excessively drained. The surface layer is gravelly sandy loam about 6 inches thick. The next layer is gravelly sandy loam or sandy loam about 19 inches thick. Below this to a depth of 60 inches is stratified gravelly sandy loam to coarse sandy loam.

Prey soils are moderately deep and well drained. The surface layer is gravelly loamy sand about 13 inches thick. The next layer is sandy loam to gravelly coarse sandy loam about 17 inches thick. The next layer is a strongly cemented hardpan about 5 inches thick. Below this to a depth of 60 inches is loamy coarse sand.

This unit is used mainly for livestock grazing and wildlife habitat. It is rapidly being urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, Indian ricegrass, and squirreltail.

This unit is limited for livestock grazing by the gravelly, coarse textured surface layer of the Prey soils and by droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides habitat for many kinds of mammals and birds.

This unit is limited for community development, sanitary facilities, and recreational development by seepage, slow percolation, and a hazard of soil blowing.

Nearly level and gently sloping soils on flood plains and low alluvial fans

The soils in this group are on flood plains and low alluvial fans along the Carson River and its tributaries, mainly in the Eagle Valley area. Elevation ranges from 4,600 to 4,700 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

The soils are moderately deep and deep and poorly drained. They formed in alluvium from mixed rock.

The soils in this group are used for crops, livestock grazing, wildlife habitat, and urban development.

The native vegetation is mainly meadow grasses, but in the drier areas big sagebrush and grasses are the most common vegetation.

One map unit is in this group. It makes up about 9 percent of the survey area.

11. Urban land-Jubilee-Bishop

Nearly level and gently sloping, moderately well drained and poorly drained, moderately deep and deep soils that have a surface layer of coarse sandy loam, fine sandy loam, sandy loam, and loam

The soils in this map unit are in the northwestern, eastern, and southern parts of Eagle Valley. They are on flood plains and low alluvial fans of the Carson River and its tributaries. The soils formed in alluvium mainly from granitic and metavolcanic rock. Elevation ranges from 4,600 to 4,700 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

This unit makes up about 9 percent of the survey area. It is 44 percent Urban land, 18 percent Jubilee soils, and 18 percent Bishop soils. The remaining 20 percent is Dalzell, Cradlebaugh, Kimmerling, Orizaba, Sagouspe, and Vamp soils, and an area of Histic Haplaquolls.

Urban land includes Carson City, its residential areas, trading centers, parks, roads and streets, and public facilities.

Jubilee soils are deep and poorly drained. The surface layer is coarse sandy loam about 20 inches thick. Below this to a depth of 60 inches is stratified coarse sandy loam and sandy loam.

Bishop soils are deep, poorly drained, and saline affected. The surface layer is loam about 28 inches thick. Below this to a depth of 60 inches is stratified sandy clay loam.

This unit is used for crops, livestock grazing, wildlife habitat, and urban development. The main crops are alfalfa and meadow grass hay.

The native vegetation is mainly meadow grasses. Where the soils are on slightly higher and drier positions, big sagebrush and grasses are the common plant cover.

This unit is limited for livestock grazing by the high water table and the hazard of flooding. Suitable management practices are those that help to maintain or improve the plant cover and control erosion.

This unit provides limited wildlife habitat because of urbanization.

This unit is limited for community development, sanitary facilities, and recreational development by the hazard of flooding and wetness.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Surprise sandy loam, 8 to 15 percent slopes, is one of several phases within the Surprise series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and soil associations.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Hocar-Rock outcrop complex, 15 to 50 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Oppio-Nosrac association is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Rock out-

crop is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

1—Aldax-Indiano association. This association consists of soils on uplands. Areas are small and are irregular in shape. Slope ranges from 15 to 50 percent. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation on the Aldax soil is 12 to 18 inches, and on the Indiano soil it is 10 to 12 inches. The average annual air temperature on the Aldax soil is 45 to 49 degrees F, and on the Indiano soil it is 48 to 50 degrees F. The frost-free season on both soils is 100 to 110 days.

This association is about 45 percent Aldax very stony fine sandy loam and 45 percent Indiano stony fine sandy loam. The Aldax soil is on south- and west-facing side slopes. The Indiano soil is on concave, north-facing side slopes.

Included with these soils in mapping are areas of Rock outcrop and Incy soils. Included areas make up about 10 percent of the total acreage.

The Aldax soil is shallow and well drained. It formed in residuum from andesitic and basaltic rock. Typically, the surface layer is grayish brown very stony fine sandy loam about 3 inches thick. The next layer is brown very stony fine sandy loam about 11 inches thick. Unweathered andesite is at a depth of about 14 inches.

Permeability of the Aldax soil is moderately rapid. Effective rooting depth is 10 to 20 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is slight.

The Indiano soil is moderately deep and well drained. It formed in colluvium and alluvium from rhyolite and altered volcanic rock. Typically, the surface layer is brown stony fine sandy loam about 13 inches thick. The next layer is light yellowish brown gravelly clay loam about 20 inches thick. Weathered rhyolite is at a depth of 33 inches; it is unweathered at a depth of 37 inches.

Permeability of the Indiano soil is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is slight.

These soils are used for livestock grazing, but they are better suited to wildlife habitat.

The native vegetation in this association is big sagebrush, antelope bitterbrush, grasses, and some scattered singleleaf pinyon and Utah juniper.

These soils are poorly suited to irrigated crops, because of slope.

Overgrazing on these soils has caused the plant cover to deteriorate. Use of brush control and seeding is very limited by the stones on the surface and the steepness of slopes. Deferred grazing and other management practices that help to maintain a good plant cover are needed.

The potential is fair for rangeland wildlife habitat. These soils provide food and cover for mule deer, bobcat, coyote, cottontail rabbit, and chukar. Suitable management practices are those that improve and maintain the habitat for these wildlife species. Aldax part in capability subclass VIIs, nonirrigated, and Indiano part in capability subclass VIIs, nonirrigated.

2—Aldax Variant-Rock outcrop complex, 30 to 50 percent slopes. This steep complex is mainly on mountainsides. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is 20 to 35 inches. The average annual air temperature is 44 to 45 degrees F, and the frost-free season is less than 75 days.

This complex is about 65 percent Aldax Variant very stony very fine sandy loam and about 15 percent Rock outcrop. The Aldax Variant soil is mainly on south-facing slopes. Rock outcrop is mainly at the crest of mountains and on ridges scattered throughout areas of the Aldax Variant soil.

Included with this complex in mapping are some small areas of Vicee soils in saddles and small areas of a shallow soil that is underlain by granitic rock. Included areas make up about 20 percent of the total acreage.

The Aldax Variant soil is shallow and well drained. It formed in residuum from metavolcanic rock. Typically, the surface layer is gray and grayish brown very stony very fine sandy loam about 5 inches thick. The next layer is light gray very gravelly very fine sandy loam about 10 inches thick. Weathered metavolcanic bedrock is at a depth of 15 inches.

Permeability of the Aldax Variant soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

Rock outcrop commonly is barren metavolcanic rock, but in some places it is covered by a few inches of soil material.

This complex is used for livestock grazing, wildlife habitat, watershed, and woodland.

The native vegetation on this complex is an open stand of Jeffrey pine and an understory of antelope bitterbrush, big sagebrush, and grasses.

The complex is poorly suited to irrigated crops because of the steep slopes.

The potential is poor for livestock grazing. The slopes are steep, and the soil erodes easily. Deferred grazing and other grazing management practices that help to maintain a good plant cover are needed to control erosion.

The potential is very poor for woodland and rangeland wildlife habitat. The complex provides some food and cover for mule deer and predators such as mountain lion, bobcat, and coyote. Revegetation of denuded areas by seeding or planting grasses, shrubs, and forbs provides food and cover for wildlife.

This complex is suited to woodland. It has a stand of Jeffrey pine that is capable of producing about 5,200 cubic feet, or 16,400 board feet (Scribner rule), of wood per acre from a fully stocked, even-aged stand of 100-year-old

trees. Production and harvesting of timber are limited by the steepness of slopes and the hazard of erosion. Stones on the surface and rock outcrops limit the use of equipment. Capability subclass VIIe, nonirrigated.

3—Arkson-Rock outcrop complex, 30 to 50 percent slopes. This complex consists of steep soils on mountainsides. Areas are long and convex. Elevation ranges from 7,500 to 9,000 feet. The average annual precipitation is 30 to 40 inches. Average annual air temperature is 40 to 45 degrees F, and the frost-free season is less than 75 days.

This complex is about 70 percent Arkson stony very fine sandy loam and about 20 percent Rock outcrop. The Arkson soil is on undulating north- and east-facing side slopes. The Rock outcrop is scattered throughout areas of the Arkson soil.

Included with this complex in mapping are some areas of Arkson soils that have a thinner surface layer because of erosion. Also included is a soil that is similar to this Arkson soil but is very gravelly and only moderately deep. Included areas make up about 10 percent of the total acreage.

The Arkson soil is deep and well drained. It formed in colluvium from metavolcanic rock. Typically, the surface layer is grayish brown and brown stony very fine sandy loam about 15 inches thick. The next layer is very pale brown gravelly very fine sandy loam about 25 inches thick. Below this, to a depth of more than 60 inches, is very pale brown very gravelly very fine sandy loam.

Permeability of the Arkson soil is moderate. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is high.

Rock outcrop is mainly barren metavolcanic rock, but in some places it is covered by a few inches of soil material.

This complex is used for livestock grazing, wildlife habitat, watershed, and woodland.

The native vegetation on the Arkson soil consists of lodgepole pine, western white pine, Jeffrey pine, and an understory of big sagebrush and grasses. Lodgepole pine generally increases on this site following fires.

This complex is poorly suited to irrigated crops because of slopes.

The potential is fair for woodland wildlife habitat. The complex provides food and cover for mule deer, bobcat, mountain lion, coyote, and grouse. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Revegetation of denuded areas by seeding or planting grasses, shrubs, and forbs provides food and cover for wildlife.

The potential is poor for woodland. The complex has a stand of lodgepole pine, western white pine, and Jeffrey pine. It is capable of producing about 5,925 cubic feet, or 15,650 board feet (Scribner rule), of lodgepole pine per acre from a fully stocked, even-aged stand of 100-year-old trees (*4*). The production and harvesting of timber are limited by the steepness of slopes and the hazard of erosion. The presence of stones on the surface and the Rock outcrops limit the use of equipment. Capability subclass VIIs, nonirrigated.

4—Bishop loam, saline. This deep, poorly drained soil is on flood plains. It formed in mixed alluvium. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is about 49 to 50 degrees F, and the frost-free season is about 100 to 110 days.

Typically, the surface layer is light brownish gray and grayish brown loam about 28 inches thick. Below this to a depth of 60 inches is light brownish gray, pale brown, and pale olive, stratified sandy loam to sandy clay loam.

Included with this soil in mapping is a small area of soils near the Carson River that have a clay loam surface layer and a clay subsoil and substratum; they are slightly to strongly saline-alkali affected. Also included are areas of Bishop soils that are strongly saline-alkali affected and a small area of soils that have been drained by deepening the channel of the Carson River. Included soils make up about 10 percent of the total acreage.

Permeability of this Bishop soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is very slow, and the hazard of erosion is slight. The water table is at a depth of 18 to 24 inches. Shallow, low-velocity flooding is common. This soil is slightly saline affected.

This soil is used almost entirely for meadow hay and pasture. Small areas along fence rows and in odd corners have native vegetation that is used along with the pasture. Rapid expansion of Carson City has resulted in urbanization of much of this soil.

The application of water on this soil is mainly by wild flooding. Irrigation methods suitable for this soil are border systems or corrugation systems, or both, where the soil is smooth; where it is undulating, contour furrow systems and irrigation water management help to prevent the raising of the water table.

This soil is capable of producing about 10 animal units per month of forage per acre. Seeding of pasture and hayland and using management that improves and maintains desirable forage plants are good practices.

The potential is poor for openland wildlife habitat and fair for wetland wildlife habitat. This soil provides some food and cover for ducks, geese, and shore birds. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Plantings of Japanese millet, proso millet, and saltmarsh bulrush would provide additional food for waterfowl.

The potential is poor for community development, sanitary facilities, and recreational uses because of the moderately slow permeability, the hazard of flooding, and the high water table. Contamination of the ground water supply is also a hazard. Providing drainage and an outlet for floodwaters alleviates many of these problems. A community sewage system is also needed. Capability subclasses IIIw, irrigated, and VIw, nonirrigated.

5—Cagle-Nosrac association. This association consists of moderately steep to steep soils on mountainsides. Areas are large. Elevation ranges from 5,800 to 6,800 feet. The average annual precipitation is 12 to 16 inches.

The average annual air temperature on the Cagle soil is 47 to 50 degrees F, and on the Nosrac soil it is 45 to 48 degrees F. The frost-free season is 80 to 100 days.

This association is about 60 percent Cagle very stony clay loam that has slopes of 15 to 50 percent and about 25 percent Nosrac stony clay loam that has slopes of 30 to 50 percent. The Cagle soil is undulating and is on south- and west-facing side slopes. The Nosrac soil is on north-facing side slopes.

Included with these soils in mapping are areas of Deven and Oppio soils and severely eroded Cagle soils. Also included are areas of deep, gravelly, loamy soils on small fans and deep, erratically stratified, loamy soils on small bottoms along creek channels. These included soils make up 15 percent of the total acreage.

The Cagle soil is moderately deep and well drained. It formed in residuum and colluvium from andesite or basalt. Typically, the surface layer is grayish brown very stony clay loam about 2 inches thick. The next layer is dark gray and dark grayish brown clay and gravelly clay about 15 inches thick. Below this is olive gray very gravelly clay about 13 inches thick over weathered andesitic bedrock.

Permeability of the Cagle soil is slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Surface runoff is rapid, and the hazard of erosion is high.

The Nosrac soil is deep and well drained. It formed in colluvium from andesite and schist. Typically, the surface layer is grayish brown stony and gravelly clay loam about 9 inches thick. The next layer is brown very gravelly clay loam about 25 inches thick. Below this to a depth of 60 inches is olive very gravelly loam.

Permeability of the Nosrac soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is moderate.

These soils are used mainly for wildlife habitat and watershed.

The native vegetation consists of closed stands of singleleaf pinyon and Utah juniper and of open stands of singleleaf pinyon and Utah juniper and an understory of big sagebrush, antelope bitterbrush, and grasses.

This association is poorly suited to irrigated crops because of the slopes.

The potential is poor for livestock grazing. Mechanical management practices are not practical, because the surface is stony and because of the slope. Overgrazing has caused the range to deteriorate so that it does not produce appreciable quantities of vegetation suitable for livestock grazing. Rotation grazing and other grazing management practices help to maintain and improve the plant cover and forage production.

The potential is poor to fair for woodland wildlife habitat. The soils provide limited food and cover for mule deer, wild horses, and some kinds of upland wildlife. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the amount of forage available for wildlife.

The potential for woodland is poor. The stands of singleleaf pinyon and Utah juniper are both open and closed and of low quality. These stands have very limited commercial value. They produce a small quantity of pine nuts, some Christmas trees, fenceposts, and firewood. The stand is capable of producing about 14 cords of wood per acre. Parts of this association may have potential for wood chipping operations, but the most desirable stands are in the least accessible areas. It is limited for this use mainly by the steepness of slope and the hazard of erosion. The presence of stones on the surface influence operations involving the use of equipment. Cagle part in capability subclass VIIs, nonirrigated, and Nosrac part in capability subclass VIIs, nonirrigated.

6—Cagwin gravelly sand, 15 to 30 percent slopes. This moderately deep and somewhat excessively drained soil is on short mountainsides. It formed in colluvium weathered from granitic rock. Elevation ranges from 8,500 to 9,000 feet. The average annual precipitation is 35 to 40 inches, most of which falls as snow. The average annual air temperature is 36 to 40 degrees F, and the average frost-free season is less than 75 days.

Typically, the surface layer is grayish brown gravelly sand about 7 inches thick. The next layer is pale brown gravelly coarse sand about 33 inches thick over weathered granitic bedrock.

Included with this soil in mapping are areas of soils that are similar to this Cagwin soil but that have 35 to 50 percent gravel in the profile. Also included are areas of soils that are more than 40 inches deep over weathered granitic bedrock. Included soils make up about 10 percent of the total acreage.

Permeability of this Cagwin soil is rapid. Effective rooting depth is about 30 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

This soil is used for limited livestock grazing, wildlife habitat, watershed, and woodland.

The native vegetation is mainly California red fir and some Jeffrey pine. In cutover or burned areas are big sagebrush, pointleaf manzanita, and grasses.

This soil is limited for livestock grazing by a moderate hazard of erosion. Deferred grazing and other grazing management practices help to maintain a good understory plant cover and to protect the soil from erosion.

The potential is poor for woodland wildlife habitat. The soil provides food and cover for mule deer, quail, blue grouse, sage grouse, bear, and mountain lion. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the amount of forage available for wildlife.

This soil is suited to woodland. It has a stand of California red fir. It is capable of producing about 7,050 cubic feet, or 35,050 board feet (Scribner rule), of timber

per acre from a fully stocked, even-aged stand of 100-year-old trees (*6*). The main limitations for the production and harvesting of timber are the high hazard of erosion and droughtiness. The loose soil surface limits the use of equipment.

The potential is poor for community development, sanitary facilities, and recreational development. This soil is limited for these uses by the steepness of slope and depth to rock. Leveling for house pads and access roads exposes the bedrock. Houses and roads must be designed to minimize cuts that increase surface runoff and the hazard of erosion. Seepage is a hazard to health in places, particularly on lower slopes because this soil is rapidly permeable. Capability subclass VIIs, nonirrigated.

7—Cagwin-Toem complex, 30 to 75 percent slopes. This complex consists of soils on mountainsides and ridges. Elevation ranges from 7,500 to 9,000 feet. The mean annual precipitation is 35 to 45 inches, much of which occurs as snow. The average annual air temperature is about 36 to 40 degrees F, and the frost-free season is less than 45 days.

This complex is about 70 percent Cagwin gravelly sand that has slopes of 30 to 50 percent and about 20 percent Toem gravelly coarse sand that has slopes of 50 to 75 percent. The Cagwin soil is on long, steep side slopes. The Toem soil is on very steep side slopes and ridges.

Included with these soils in mapping is a soil that is similar to the Cagwin soil but is very deep. Also included are areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Cagwin soil is moderately deep and somewhat excessively drained. It formed in colluvium from granitic rock. The surface layer is grayish brown gravelly sand about 7 inches thick. The next layer is pale brown gravelly coarse sand about 30 inches thick. Weathered granitic bedrock is at a depth of 37 inches.

Permeability of the Cagwin soil is rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Surface runoff is rapid, and the hazard of erosion is high.

The Toem soil is shallow and excessively drained. It formed in residuum from weathered granitic rock. The surface layer is grayish brown gravelly coarse sand about 7 inches thick. The next layer is light brownish gray gravelly coarse sand about 10 inches thick. Weathered granitic bedrock is at a depth of 17 inches.

Permeability of the Toem soil is rapid. Effective rooting depth is about 17 inches. Available water capacity is low. Surface runoff is rapid, and the hazard of erosion is high.

These soils are used for limited sheep grazing, wildlife habitat, watershed, and woodland.

The native vegetation on these soils is California red fir, western white pine, Jeffrey pine, and an understory of big sagebrush, pointleaf manzanita, Thurber needlegrass, snowbrush, and squirreltail.

These soils are limited for livestock grazing by steep to very steep slopes and a high hazard of erosion. Deferred grazing and other grazing management practices are needed to maintain a good understory plant cover and to protect the soils from erosion.

The potential is poor for woodland wildlife habitat. These soils provide food and cover for mule deer, bobcat, mountain lion, coyote, and blue grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for commercial woodland. The soils support a stand of California red fir, western white pine, and Jeffrey pine. They are capable of producing about 8,100 cubic feet, or 44,245 board feet (Scribner rule), of timber per acre from a fully stocked, even-aged stand of 100-year-old California red fir. The main limitations for the production and harvesting of timber are droughtiness, steepness of slope, and the high hazard of erosion. These limitations, along with the sandy surface and Rock outcrops, also restrict operations involving the use of equipment. Capability subclass VIIs, nonirrigated.

8—Corbett gravelly sand, 8 to 15 percent slopes. This moderately deep, somewhat excessively drained soil is on mountainsides. It formed in colluvium from granitic bedrock. Slopes are short and narrow. Elevation ranges from 6,000 to 6,500 feet. The mean annual precipitation is 30 to 40 inches, most of which occurs as snow. The average annual air temperature is 42 to 45 degrees F, and the frost-free season is 45 to 75 days.

Typically, the surface layer is dark grayish brown and grayish brown gravelly sand and gravelly loamy coarse sand about 8 inches thick. The next layer is a light brownish gray and light gray gravelly loamy coarse sand about 32 inches thick. Weathered granitic bedrock is at a depth of 40 inches.

Included with this soil in mapping are areas of Toiyabe soils, a small acreage of soils that are similar to this Corbett soil but are 40 to 60 inches deep over granitic bedrock, and areas of Rock outcrop. Included areas make up less than 10 percent of the total acreage.

Permeability of this Corbett soil is rapid. Effective rooting depth is about 40 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used for limited livestock grazing, wildlife habitat, woodland, and watershed.

The native vegetation is Jeffrey pine and an understory of pointleaf manzanita, snowbrush, antelope bitterbrush, and grasses.

This soil is limited for livestock grazing mainly by droughtiness. Deferred grazing and other grazing management practices help to maintain or improve the understory plant cover and protect the soil from erosion.

The potential is poor for woodland wildlife habitat. The soil provides food and cover for mule deer, coyote, quail, blue grouse, and sage grouse. Bear and mountain lion have been seen in the area. Suitable management practices are those that help to maintain and improve the

habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. The soil has a stand of Jeffrey pine and white fir. It is capable of producing about 4,750 cubic feet, or 13,100 board feet (Scribner rule), of timber per acre from a fully stocked, even-aged stand of 100-year-old Jeffrey pine. The soil is limited for the production and harvesting of timber by the gravelly sand surface layer and droughtiness. The loose surface layer in places limits use of equipment.

The potential is poor for community development, sanitary facilities, and recreational development. The soil is limited for these uses by slope and depth to bedrock. Excavation for houses and access roads exposes bedrock in places. Depth to bedrock also may affect proper operation of septic tank absorption fields, which can create a hazard to health in areas of moderate- or high-density housing. In these areas community sewage disposal systems are needed. Capability subclass VIIs, nonirrigated.

9—Corbett gravelly sand, 30 to 50 percent slopes. This moderately deep, somewhat excessively drained, steep soil is on mountainsides. It formed in colluvium from granitic bedrock. Slopes are short and narrow. Elevation ranges from 6,000 to 6,500 feet. The average annual precipitation, most of which falls as snow, is 35 to 40 inches. The average annual air temperature is 35 to 45 degrees F, and the frost-free season is 45 to 75 days.

Typically, the surface layer is dark grayish brown and grayish brown gravelly sand and gravelly loamy coarse sand about 8 inches thick. The next layer is light brownish gray and light gray gravelly loamy coarse sand about 32 inches thick. Weathered granitic bedrock is at a depth of 40 inches.

Included with this soil in mapping are small areas of stony Toiyabe soils and Rock outcrop. Also included are areas of soils that are similar to this Corbett soil but are more than 40 inches deep. Included soils make up less than 10 percent of the total acreage.

Permeability of this Corbett soil is rapid. Effective rooting depth is 24 to 40 inches. Available water capacity is very low. Surface runoff is moderate, and the hazard of erosion is high.

This soil is used mainly for sheep grazing, wildlife habitat, woodland, and watershed.

The native vegetation is Jeffrey pine and an understory of pointleaf manzanita, snowbrush, antelope bitterbrush, and grasses. The thicker stands of timber have little or no understory.

The potential is poor for grazing. The soil is limited for this use by droughtiness, steepness of slope, and the high hazard of erosion. Deferred grazing and other grazing management practices help to maintain a good understory plant cover and to prevent erosion.

The potential is poor for woodland wildlife habitat. The soil provides food and cover for mule deer, mountain lion, coyote, and blue grouse. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. The soil is capable of producing about 4,750 cubic feet, or 13,100 board feet (Scribner rule), of timber per acre from a fully stocked, even-aged stand of 100-year-old Jeffrey pine. It is limited for the production and harvesting of timber by droughtiness, steepness of slope, hazard of erosion, and Rock outcrops. The steep slopes and the gravelly sand surface layer limit the use of equipment. Capability subclass VIIs, nonirrigated.

10—Corbett-Toiyabe association. This association consists of very steep soils on mountainsides. Slopes range from 50 to 75 percent. Areas are large and are irregular in shape. Elevation ranges from 6,000 to 7,500 feet. The mean annual precipitation on the Corbett soil is 35 to 45 inches, which occurs mostly as snow; on the Toiyabe soil it is 25 to 35 inches. The average annual air temperature is about 40 to 45 degrees F on the Corbett soil and 42 to 45 degrees F on the Toiyabe soil. The frost-free season on both soils is less than 100 days.

This association is about 65 percent Corbett stony loamy coarse sand and about 25 percent Toiyabe stony loamy coarse sand. The Corbett soil is on long, slightly convex, north- and east-facing side slopes. The Toiyabe soil is on long, south-facing side slopes and on ridges.

Included with these soils in mapping is a soil that is similar to this Corbett soil but is more than 40 inches deep over bedrock. Also included are areas of Rock outcrop along ridgetops. Included areas make up about 10 percent of the total acreage.

The Corbett soil is moderately deep and somewhat excessively drained. It formed in colluvium from weathered granitic bedrock. Typically, the profile is dark grayish brown stony loamy coarse sand about 8 inches thick. The next layer is light gray gravelly and cobbly loamy coarse sand about 32 inches thick. Weathered granitic bedrock is at a depth of about 40 inches.

Permeability of the Corbett soil is rapid. Effective rooting depth is 24 to 40 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is very high.

The Toiyabe soil is excessively drained and shallow. It formed in residuum from granitic rock. Typically, the surface layer is gray stony loamy coarse sand about 5 inches thick. The next layer is gray gravelly coarse sand about 6 inches thick. Weathered granitic bedrock is at a depth of about 11 inches.

Permeability of the Toiyabe soil is rapid. Effective rooting depth is about 11 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is very high.

The soils in this association are used for sheep grazing, wildlife habitat, and watershed.

The native vegetation on the Corbett soil is Jeffrey pine and an understory of antelope bitterbrush and some grasses. The native vegetation on the Toiyabe soil is

Jeffrey pine, white fir, and an understory of antelope bitterbrush and some grasses.

The potential is poor for grazing. The soils are limited for this use by droughtiness, very steep slopes, and a high hazard of erosion. Deferred grazing and other grazing management practices help to maintain a good understory plant cover and to control erosion.

The potential for woodland wildlife habitat is poor. The soils provide limited food and cover for mule deer, coyote, and blue grouse. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is very poor on both soils for timber production because of droughtiness, very steep slopes, and shallow depth to bedrock. The stands are sparse, and the production of timber is very low. Corbett soil in capability subclass VIIs, nonirrigated, and Toiyabe soil in VIIe, nonirrigated.

11—Cradlebaugh loam, strongly saline-alkali. This deep, poorly drained, nearly level soil is on flood plains. It formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is about 49 degrees F, and the frost-free season is 90 to 105 days.

Typically, the profile is dark gray, strongly saline-alkali affected loam about 6 inches thick. The next layer is brown clay loam about 18 inches thick. Below this to a depth of 60 inches is light brownish gray, mottled, crudely stratified clay loam to fine sandy loam. Strongly silica-cemented nodules or discontinuous laminae are at a depth of 22 to 60 inches.

Included with this soil in mapping are areas of Voltaire and Jubilee soils. These soils make up less than 10 percent of the total acreage.

Permeability of this Cradlebaugh soil is moderately slow. Effective rooting depth is more than 60 inches. Available water capacity is high. Surface runoff is slow, and the hazard of erosion is slight. The salt and alkali content is highest in the surface layer and decreases with depth. The water table is at a depth of 1 foot to 2 feet. This soil is subject to frequent overflow during the spring runoff period.

This soil is used almost entirely for meadow hay and pasture.

If properly managed, this soil is capable of producing about 6 animal units of forage per month per acre. It is limited for the production of meadow hay and pasture by the concentration of salt and alkali in the surface layer. Leaching of salt from the surface layer is restricted by the high water table. Drainage and irrigation water management reduce the concentration of salt. Irrigation water is applied mainly by the wild flooding and border methods. Leveling helps to insure uniform application of water. A beneficial practice is planting salt-tolerant species such as tall wheatgrass, alkali sacaton, alta fescue, or goars fescue.

The potential is good for wetland wildlife habitat, both in irrigated areas and in nonirrigated areas. In irrigated areas, the potential is fair for openland wildlife habitat. Habitat for waterfowl is improved by planting Japanese millet and proso millet, and habitat for openland bird species is improved by planting hedgerows for nesting. Ducks and geese inhabit areas of this soil in winter.

The potential is poor for community development, sanitary facilities, and recreational areas. This soil is limited for these uses by wetness and hazard of flooding. Deep drainage reduces the problem of wetness and provides outlets for floodwater. Capability subclass VIIw, nonirrigated.

12—Dalzell fine sandy loam, deep water table. This moderately deep, moderately well drained, saline-alkali affected soil is on flood plains and low alluvial fans. It formed in alluvium from mixed rock. Areas are small and irregular in shape. Slope ranges from 0 to 2 percent. Elevation is about 4,800 feet. The mean annual precipitation is about 10 inches. The average annual air temperature is about 50 degrees F, and the frost-free season is about 110 days.

Typically, the surface layer is slightly saline-alkali affected, light brownish gray and brown fine sandy loam about 10 inches thick. The next layer is saline-alkali affected, dark grayish brown clay loam about 10 inches thick. Below this is pale brown stratified fine sandy loam to sandy clay loam about 19 inches thick. A strongly silica-cemented hardpan is at a depth of 39 inches.

Included with this soil in mapping are small areas of soils that are similar to this Dalzell soil but do not have a hardpan and some areas of soils that are somewhat poorly drained. Also included are small areas of soils that have slopes of 2 to 4 percent. Included soils make up about 10 percent of the total acreage.

Permeability of this Dalzell soil is moderately slow above the hardpan and very slow through the pan. Effective rooting depth is about 30 to 40 inches. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight. This soil is subject to rare flooding.

This soil is used for urban development.

The native vegetation is big sagebrush, black greasewood, and grasses.

The potential is fair to poor for community development and recreational uses. The main limitations for community development are wetness and rare flooding, and the main limitation for recreational uses is dustiness. The limitations of wetness and rare flooding can be partly overcome by providing drainage and outlets for floodwater. A community sewage system is needed. Dustiness can be controlled by planting grass and shrubs. Capability subclass VIs, irrigated.

13—Dalzell Variant fine sandy loam, 0 to 4 percent slopes. This deep, well drained soil is on undulating low lake terraces. It formed in lake sediment derived from mixed rock. Elevation is about 4,700 feet. The mean annual precipitation is about 10 inches, the average annual

air temperature is about 49 degrees F. The frost-free season is 105 to 110 days.

Typically, the surface layer is light brownish gray fine sandy loam about 10 inches thick. The next layer is dark brown gravelly clay and clay loam about 15 inches thick. The next layer is light gray loam about 11 inches thick. Below this to a depth of 60 inches is light gray and pale brown, stratified loam and fine sandy loam.

Included with this soil in mapping are small areas of Greenbrae fine sandy loam that have slopes of slightly more than 4 percent and some areas of Dalzell fine sandy loam that have been drained. Included areas make up less than 10 percent of the total acreage.

Permeability of this Dalzell soil is slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used for livestock grazing and urban development.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

This soil is limited for livestock grazing by climate and slow permeability. Use of deferred grazing and other grazing management practices helps to maintain or improve the plant cover.

The potential is fair to poor for community development and sanitary facilities. A community sewage system is needed. Where this soil is used for recreational purposes, dustiness can be controlled by planting grass and shrubs. Capability subclass VIs, nonirrigated.

14—Deven-Rock outcrop complex, 4 to 15 percent slopes. This moderately sloping to strongly sloping complex is on uplands. Areas are irregular in shape. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is about 49 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent Deven very cobbly loam and about 15 percent Rock outcrop. Rock outcrop is on ridges and steeper side slopes throughout areas of the Deven soil.

Included with this complex in mapping are small areas of Nosrac soils and a soil that is similar to this Deven soil but has a surface layer that is covered by 10 to 30 inches of wind-deposited fine sand. Included soils make up about 15 percent of the total acreage.

The Deven soil is shallow and well drained. It formed in residuum from andesite. Typically, the Deven soil has a surface layer of light brownish gray very cobbly loam about 3 inches thick. The next layer is brown gravelly clay and clay about 6 inches thick. Andesite is at a depth of 9 inches.

Permeability of the Deven soil is slow. The effective rooting depth is about 9 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

Rock outcrop consists of exposures of andesite and basalt that in some places are covered by a few inches of soil material.

This complex is used for livestock grazing and wildlife habitat.

The native vegetation is low sagebrush, antelope bitterbrush, grasses, and some scattered singleleaf pinyon and Utah juniper.

The potential is poor for grazing. The soil is limited for this use by the very cobbly surface and very low available water capacity. Deferred grazing and other grazing management practices improve the plant cover and help to control erosion.

The potential is fair for rangeland wildlife habitat. This complex provides some food and cover for mule deer, quail, chukar, cottontail rabbit, and coyote. Wild horses are common. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. The complex is limited for these uses by slope, shallow soil depth, and Rock outcrops. Excavation for houses and access roads exposes bedrock. Houses and roads must be designed to minimize cuts that increase runoff and produce erosion. Recreational developments must be designed to avoid the rock outcrops and to avoid making cuts that expose the bedrock. Capability subclass VIIs, nonirrigated.

15—Deven-Rock outcrop complex, 15 to 50 percent slopes. This moderately steep to steep complex is on uplands. Areas are irregular in shape. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is about 49 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent Deven very cobbly loam and about 20 percent Rock outcrop. The Deven soil is on short, convex slopes. Rock outcrop is on ridges and is scattered throughout areas of the Deven soil.

Included with this complex in mapping are areas of Oppio soils and a soil that is similar to this Deven soil but has a surface that is covered by 10 to 50 inches of wind-deposited fine sand; these soils are on north-facing slopes and in draws. Included soils make up about 10 percent of the total acreage.

The Deven soil is shallow and well drained. It formed in residuum from basic igneous rock. Typically, the surface layer is light brownish gray very cobbly loam about 5 inches thick. The next layer is brown gravelly clay and clay loam about 7 inches thick. Hard basalt is at a depth of 12 inches.

Permeability of this Deven soil is slow. The effective rooting depth is about 12 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high.

Rock outcrop consists mainly of barren areas of basalt, but in some places it is covered by a few inches of soil material.

This complex is used for livestock grazing and wildlife habitat.

The native vegetation on the Deven soil is big sagebrush, low sagebrush, grasses, and some scattered singleleaf pinyon and Utah juniper.

The potential is poor for livestock grazing. The main limitations for this use are droughtiness and the very cobbly surface layer. Deferred grazing and other grazing management practices help to maintain or improve the plant cover.

The potential is fair for rangeland wildlife habitat. The complex provides food and cover for mule deer, chukar, quail, rabbit, and coyote. Suitable management practices are those that maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIe, nonirrigated.

16—Fettic Variant very fine sandy loam, 2 to 4 percent slopes. This shallow, moderately well drained, strongly saline-alkali affected soil is on alluvial fans. Areas are small and slightly convex. Elevation is about 4,700 feet. The mean annual precipitation is about 10 to 12 inches. The average annual air temperature is 48 to 49 degrees F, and the frost-free season is 100 to 105 days.

Included with this soil in mapping are small areas of Toll sand, Holbrook gravelly fine sandy loam, and Fettic very fine sandy loam. Included soils make up less than 10 percent of the total acreage.

Typically, the surface layer is grayish brown very fine sandy loam about 5 inches thick. The next layer is light olive brown clay loam about 5 inches thick. The next layer is a strongly silica-cemented hardpan about 26 inches thick. Below this to a depth of 60 inches is brown sandy clay loam.

Permeability of this Fettic Variant soil is moderately slow above the hardpan. The effective rooting depth is about 10 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight. Drainage has been improved by natural entrenchment of the creek channel and local pumping. Depth to the water table is now more than 6 feet.

This soil is used mainly for pasture. It is grazed by cattle in winter.

The native vegetation is basin wildrye, saltgrass, and brush.

The potential of this soil for the production of herbage during years of normal rainfall is about 1,000 pounds per acre. Deferred grazing and other pasture management practices improve the stand of grasses.

The potential is very poor for irrigated crops because of the high salt and alkali content of the soil. Reclamation of this soil is difficult because it has a strongly cemented hardpan, which is very slowly permeable. At best, only salt-tolerant grasses could be grown after ripping the hardpan, providing adequate drainage, and leaching the salts from the surface layer.

The potential is very poor for openland wildlife habitat. Quail and cottontail rabbit are the main kinds of wildlife on this soil, but there are some mule deer in the area. Planting shrubs or tall grasses around the edge of fields or in hedgerows provides valuable food and cover for wildlife. Capability subclass VIIs, nonirrigated.

17—Glenbrook gravelly loamy coarse sand, 4 to 8 percent slopes. This shallow, somewhat excessively drained, gently rolling and moderately sloping soil is in areas a few feet above the flood plain. Areas are small and irregular in shape. Elevation ranges from 4,700 to 5,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 49 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown gravelly loamy coarse sand about 14 inches thick. It is underlain by granitic bedrock.

Included with this soil in mapping are small areas of Rock outcrop and of Incy soils on east-facing slopes. Included areas make up less than 5 percent of the total acreage.

Permeability of this Glenbrook soil is rapid. Effective rooting depth is 10 to 14 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used for limited livestock grazing and for wildlife habitat.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential for livestock grazing is poor. The soil is limited for this use by shallow depth and very low available water capacity. Deferred grazing and other pasture management practices help to maintain or improve the native plant cover.

This soil is not suited to irrigated crops, because it is shallow and droughty.

The potential is fair for rangeland wildlife habitat. The soil provides limited food and cover for mule deer, coyote, and chukar. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. Leveling of sites for houses and access roads exposes bedrock. Houses and roads must be designed to minimize cuts that increase surface runoff and the hazard of erosion. Community sewage systems are needed. Leveling for recreational uses exposes bedrock; therefore, it is necessary to carefully select the site and the design of facilities. Capability subclass VIIs, nonirrigated.

18—Glenbrook-Rock outcrop complex, 8 to 30 percent slopes. This strongly sloping and moderately steep complex is on rolling to hilly uplands. Elevation ranges from 5,000 to 5,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent Glenbrook gravelly loamy coarse sand and 20 percent Rock outcrop. The

Glenbrook soil is on south- and east-facing side slopes. The Rock outcrop is mainly along ridgetops.

The Glenbrook soil is shallow and somewhat excessively drained. It formed in residuum from granitic bedrock. Typically, the Glenbrook soil has a surface layer of light brownish gray gravelly loamy coarse sand about 14 inches thick. Granitic bedrock is at a depth of 14 inches.

Included with this soil in mapping are small areas of Mottsville soils, mainly in short, steep, north-facing areas on alluvial fans. Included areas make up about 10 percent of the total acreage.

Permeability of the Glenbrook soil is rapid. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

Rock outcrop consists of barren exposures of granitic bedrock.

This complex is used mainly for livestock grazing and rangeland wildlife habitat.

The native vegetation on the Glenbrook soil is big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The soil is limited for this use by the shallow depth and very low available water capacity. Deferred grazing and other pasture management practices help to maintain or improve the plant cover and to control erosion.

The potential is fair for rangeland wildlife habitat. The soil provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. Excavation for houses and access roads exposes bedrock. Houses and roads must be designed to minimize cuts that increase surface runoff and the hazard of erosion. Community sewage systems are needed. Leveling for recreational facilities exposes bedrock; therefore, careful selection of sites and designs for facilities is necessary. Capability subclass VIIe, nonirrigated.

19—Glenbrook-Rock outcrop complex, 30 to 50 percent slopes. This steep complex is on low hills a few hundred feet above the valley floor. Areas are small and irregular in shape. Elevation ranges from 4,700 to 5,000 feet. The mean annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 75 percent Glenbrook gravelly loamy coarse sand and 15 percent Rock outcrop. The Glenbrook soil has slightly convex slopes and occurs on all aspects. Rock outcrop is mainly along the ridges, but in some places it is on side slopes.

Included with this soil in mapping are small areas of Mottsville soils on alluvial fans and a soil that is similar to this Glenbrook soil but is 20 to 40 inches deep over bedrock. Included areas make up about 10 percent of the total acreage.

The Glenbrook soil is shallow and somewhat excessively drained. It formed in residuum from granitic bedrock. Typically, the surface layer is light brownish gray gravelly loamy coarse sand about 14 inches thick. Granitic bedrock is at a depth of 14 inches.

Permeability of this Glenbrook soil is rapid. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

Rock outcrop consists mainly of barren exposures of granitic bedrock.

This complex is used mainly for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on the Glenbrook soil is big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The soil is limited for this use by shallow depth to bedrock, very low available water capacity, and steep slopes. Deferred grazing and other grazing management practices help to maintain or improve the plant cover and to control erosion.

The potential is fair for rangeland wildlife habitat. This complex provides limited food and cover for some mule deer, coyote, rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases production of forage suitable for wildlife. Capability subclass VIIe, nonirrigated.

20—Glenbrook-Rock outcrop complex, 50 to 75 percent slopes. This very steep complex is on low hills a few hundred feet above the valley floor. Areas are small and irregular in shape. Elevation ranges from 4,700 to 5,000 feet. The average annual precipitation is about 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 75 percent Glenbrook gravelly loamy coarse sand and 15 percent Rock outcrop. The Glenbrook soil has slightly convex slopes and is on all aspects. The Rock outcrop is mainly along ridges, but in places it is on side slopes.

Included with this complex in mapping are small areas of Mottsville soils on alluvial fans. Also included is a soil that is similar to this Glenbrook soil but is 20 to 40 inches deep over bedrock. Included soils make up about 10 percent of the total acreage.

The Glenbrook soil is shallow and somewhat excessively drained. It formed in residuum from granitic bedrock. Typically, the surface layer is light brownish gray gravelly loamy coarse sand about 14 inches thick. Granitic bedrock is at a depth of 14 inches.

Permeability of the Glenbrook soil is rapid. Effective rooting depth is about 14 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is high.

Rock outcrop consists mainly of barren exposures of granitic bedrock. In some places a few inches of soil material covers the rock.

This complex is used mainly for rangeland wildlife habitat and watershed. A few areas are used for livestock grazing.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by very steep slopes, shallow depth to bedrock, low available water capacity, and droughtiness. Rotation grazing and other grazing management practices help to maintain the plant cover and to control erosion.

The potential is fair for rangeland wildlife habitat. This complex provides limited food and cover for mule deer, coyote, rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. Shallow excavation and leveling for houses and access roads expose the bedrock. Houses and roads must be designed to minimize cuts that increase runoff and the hazard of erosion. Leveling for recreational uses exposes bedrock, so careful selection of sites and designs for facilities is necessary. Capability subclass VIIe, nonirrigated.

21—Greenbrae gravelly sandy loam, 4 to 8 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation ranges from 4,500 to 4,700 feet. The average annual precipitation is 8 to 10 inches. The average annual air temperature is 48 to 50 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown gravelly sandy loam about 10 inches thick. The next layer is brown sandy clay loam about 20 inches thick. Below this to a depth of 60 inches is pale brown, stratified gravelly sandy loam, sandy loam, and fine sandy loam.

Included with this soil in mapping are some small areas of Haybourne soils and of Greenbrae soils that have steep slopes. Included soils make up about 10 percent of the total acreage.

Permeability of this Greenbrae soil is moderately slow. Effective rooting depth is 60 inches. Available water capacity is moderate to high. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used for livestock grazing, wildlife habitat, and urban land.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. This soil is limited for this use mainly by low precipitation. Deferred grazing and other grazing management practices help to maintain or improve the plant cover and to control erosion. If the range has deteriorated, this soil can be seeded to adapted drought-tolerant grasses such as Nordan crested wheatgrass.

The potential is fair for rangeland wildlife habitat, but urbanization of adjacent and nearby soils has caused most of the wildlife to abandon the area.

The potential is fair for community developments and poor for recreational uses. Placement of footings at a depth of more than 3 feet provides adequate support for buildings. If density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage. This soil is limited for recreational uses by the gravelly surface and by slope. Capability subclass VIs, nonirrigated.

22—Greenbrae fine sandy loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation ranges from 4,600 to 4,700 feet. The average annual precipitation is about 10 inches. The mean annual air temperature is 48 to 50 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown fine sandy loam about 4 inches thick. The next layer is brown sandy clay loam about 20 inches thick. Below this to a depth of 60 inches is pale brown, stratified gravelly sandy loam, sandy loam, and fine sandy loam.

Included with this soil in mapping are small areas of soils that are slightly saline-alkali affected and areas of soils that have slopes of 2 to 4 percent. Included soils make up less than 5 percent of the total acreage.

Permeability of this Greenbrae soil is moderately slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used mainly for livestock grazing. It is adjacent to urban areas of Carson City and is subject to urbanization.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. The soil is limited for this use by climate. Deferred grazing and other grazing management practices help to maintain or improve the plant cover.

This soil is suited to crops.

The potential is fair for rangeland wildlife habitat, but urbanization of adjacent and nearby soils has caused most of the wildlife to abandon the area.

The potential is fair for community development. Placement of footings below a depth of 3 feet provides support and stability for buildings. If density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage. If this soil is used for recreational development, planting grasses and shrubs reduces the problem of dustiness. Capability subclass VIs, nonirrigated.

23—Haybourne sand, 0 to 4 percent slopes. This deep, well drained, nearly level to gently sloping soil is on alluvial fans. It formed in alluvium mainly from granitic rock. Slopes are short. Elevation ranges from 4,500 to 4,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 95 to 115 days.

Typically, the surface layer is pale brown sand about 9 inches thick. The next layer is brown gravelly sandy loam about 16 inches thick. Below this to a depth of 60 inches, is stratified gravelly sandy loam to coarse sand.

Included with this soil in mapping is a small acreage of Toll soils. These soils make up less than 5 percent of the total acreage.

Permeability of this Haybourne soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is low. Surface runoff is very slow, and the hazard of erosion is slight. The hazard of soil blowing is moderate.

This soil is used for livestock grazing, wildlife habitat, and urban development.

The native vegetation is big sagebrush and grasses.

The potential is poor for livestock grazing. The soil is limited for this use by droughtiness. Deferred grazing and other grazing management practices help to maintain the plant cover and provide protection from soil blowing.

This soil is limited for crops by droughtiness and lack of irrigation water.

The potential is poor for rangeland wildlife habitat. This soil provides a very limited amount of food and cover for mule deer, cottontail rabbit, grouse, quail, and coyote. Suitable management practices are those that improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development, sanitary facilities, and recreational development. Dikes or flat channels that have outlets to bypass floodwater are needed to protect dwellings and onsite sewage disposal systems from flooding. If density of housing is moderate to high, a community sewage system is needed to prevent contamination of water supplies as a result of seepage. Dustiness and soil blowing can be controlled in areas used for receational facilities by planting grass and shrubs. Capability subclass VIs, nonirrigated.

24—Haybourne sand, 8 to 15 percent slopes. This deep, well drained, strongly sloping soil is on alluvial fans. It formed in alluvium from granitic rock. Slopes are short. Elevation ranges from 4,600 to 4,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray sand about 9 inches thick. The next layer is pale brown gravelly sandy loam about 16 inches thick. Below this to a depth of 60 inches is pale brown stratified gravelly sandy loam to coarse sand.

Included with this soil in mapping are small areas of Toll sand. This soil makes up less than 10 percent of the total acreage.

Permeability of this Haybourne soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight. The hazard of soil blowing is moderate.

This soil is used mainly for urban development. It is also used for livestock grazing and wildlife habitat. Some areas adjacent to Carson City that are used for rangeland and wildlife habitat are expected to be urbanized in the near future.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. The soil is limited for this use by droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and prevent soil blowing. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The soil is limited for this use by droughtiness. It provides limited food and cover for mule deer, coyote, grouse, quail, and cottontail rabbit. Suitable management practices are those that maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development, sanitary facilities, and recreational development. The soil is limited for community development and sanitary facilities by slope and rare flooding. Some protection from flooding can be provided by using dikes and diversions to lead floodwater away from buildings. A community sewage system may be needed to prevent contamination of water supplies as a result of seepage, especially in low-lying areas. The soil is limited for recreational development by the sandy surface layer and the hazard of soil blowing. Capability subclass VIs, nonirrigated.

25—Haybourne sandy loam, 0 to 2 percent slopes. This deep, well drained, gently sloping soil is on low alluvial fans. It formed in alluvium mainly from granitic rock. Slopes are short. Elevation ranges from 4,600 to 4,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is pale brown sandy loam about 6 inches thick. The next layer is pale brown sandy loam about 19 inches thick. Below this to a depth of 60 inches is pale brown stratified gravelly sandy loam to coarse sand.

Included with this soil in mapping are small areas of a soil that is similar to this Haybourne soil. This included soil is on steep breaks of alluvial fans adjacent to the drainageways. It makes up less than 10 percent of the total acreage.

Permeability of this Haybourne soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight.

This soil is used for livestock grazing, wildlife habitat, and urban development.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. This soil is limited for this use by droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The soil provides limited food and cover for mule deer, coyote, cottontail rabbit, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development, sanitary facilities, and recreational facilities. Dikes and channels that have outlets to bypass floodwater are needed to protect dwellings from flooding. If density of housing is moderate or high, community sewage systems are needed to prevent contamination of ground water supplies. This soil is limited for recreational facilities by a hazard of flooding and by dustiness. Capability subclass VIs, nonirrigated.

26—Haybourne sandy loam, 4 to 8 percent slopes. This deep, well drained, moderately sloping soil is on alluvial fans. It formed in alluvium mainly from granitic rock. Slopes are short. Elevation ranges from 4,600 to 4,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is pale brown sandy loam about 6 inches thick. The next layer is pale brown sandy loam about 19 inches thick. Below this to a depth of 60 inches is pale brown, stratified gravelly sandy loam to coarse sand.

Included with this soil in mapping are some small areas of nearly level to strongly sloping Toll sand. This included soil makes up less than 10 percent of the total acreage.

Permeability of this Haybourne soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight.

This soil is used for livestock grazing, wildlife habitat, and urban development.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The soil provides limited food and cover for mule deer, coyote, cottontail rabbit, grouse, and quail. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities, and poor for recreational facilities. This soil is limited for recreational development by the hazard of flooding, slope, and dustiness. Dikes and channels that have outlets to bypass floodwater protect dwellings and onsite sewage disposal systems from flooding. If density of housing is moderate to high, community sewage systems are needed to protect water supplies from contamination. Capability subclass VIs, nonirrigated.

27—Haybourne gravelly sandy loam, 2 to 4 percent slopes. This deep, well drained, gently sloping soil is on low alluvial fans. It formed in alluvium mainly from granitic rock. Slopes are short. Elevation ranges from 4,600 to 4,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 95 to 110 days.

Typically, the surface layer is light brownish gray gravelly sandy loam about 6 inches thick. The next layer is brown gravelly sandy loam about 19 inches thick. Below this to a depth of 60 inches is very pale brown, stratified gravelly sandy loam to coarse sand.

Included with this soil in mapping are areas of Toll soils that are at the mouth of canyons and are subject to flooding. Also included are areas of nearly level to moderately sloping soils on the sides of drainageways. Included soils make up about 10 percent of the total acreage.

Permeability of this Haybourne soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight.

This soil is used for livestock grazing, wildlife habitat, and urban development.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. This soil is limited for this use by droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and increase the production of forage.

The potential is poor for rangeland wildlife habitat. The soil provides limited food and cover for mule deer, coyote, cottontail rabbit, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species.

The potential is fair to poor for community development and sanitary facilities and poor for recreational development. Use of this soil for recreational development is limited by the hazard of flooding and by dustiness. Dikes and channels that have outlets to bypass floodwater are needed to protect dwellings from flooding. If density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies from seepage. Capability subclass VIs, nonirrigated.

28—Histic Haplaquolls, nearly level. These deep, very poorly drained soils are in slightly concave, old channels

on flood plains. These soils formed in alluvium from mixed rock. Slope is less than 1 percent. Elevation is 4,600 feet. The average annual precipitation is about 10 inches. The average annual air temperature is about 48 degrees F, and the frost-free season is about 90 days.

Typically, the surface layer is black fibrous peat about 9 inches thick. The next layer is mottled, dark gray silt loam about 18 inches thick. The next layer to a depth of 60 inches is mottled, dark gray and light olive gray, stratified silty clay loam to sand.

Included with these soils in mapping are small areas of Bishop loam and some small areas of soils that have been diked. Included soils make up less than 10 percent of the total acreage.

Effective rooting depth is 60 inches. The hazard of erosion is slight. Ponds form on these soils, and the water table is at or near the surface most of the year.

These soils are used for limited livestock grazing and for wildlife habitat.

The native vegetation is bulrush, cattail, sedge, and rush.

The potential is poor for livestock grazing. The soils are limited for this use by the high water table and the poor quality of the vegetation. Livestock graze mostly on the perimeters of areas of these soils. Suitable management practices are those that improve the quality and quantity of the vegetation by lowering the water table to below a depth of 18 inches. This requires use of shallow drainage ditches, which is practical if suitable outlets can be located.

The potential is good for wetland wildlife habitat. The soils provide food and cover for ducks, geese, and shore birds. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Plantings of annual Japanese millet or proso millet increase the production of food suitable for these wildlife species.

The potential is poor for community development, sanitary facilities, and recreational development. The soils are limited for these uses by the high water table and a hazard of flooding. They are not suitable for these uses unless the water table is lowered to below a depth of 4 feet and protection from flooding is provided. Capability subclass Vw, nonirrigated.

29—Hocar-Rock outcrop complex, 15 to 50 percent slopes. This moderately steep to steep complex is on moderately long, narrow ridges and sides of low mountains. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent Hocar gravelly loam and about 20 percent Rock outcrop. The Hocar soil is on west- and south-facing side slopes. Rock outcrop is on the ridges and is scattered throughout areas of the Hocar soil.

Included with this complex in mapping are some small areas of Incy and Xerta soils and a soil that is similar to this Hocar soil but is deeper. Included soils make up about 10 percent of the total acreage.

The Hocar soil is shallow and well drained. It formed in residuum from metasedimentary rock. Typically, the surface layer is dark gray and grayish brown gravelly loam about 7 inches thick. The next layer is gray very gravelly loam about 10 inches thick. Metasedimentary bedrock is at a depth of 17 inches.

Permeability of this Hocar soil is moderate. Effective rooting depth is about 17 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

Rock outcrop consists mainly of barren exposures of rock. In places a few inches of soil material covers the rock.

This complex is used mainly for livestock grazing, wildlife habitat, and watershed.

The native vegetation is singleleaf pinyon, Utah juniper, and an understory of big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by shallow depth, very low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for woodland wildlife habitat. The complex provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for the production of wood products. The complex is capable of producing about 4 cords of wood per acre when the trees in the stand average 5 inches in diameter at a height of 1 foot. Stands of trees are generally intermingled, unmanaged, and of mixed ages. Some pinyon pine is cut for firewood, and pine nuts are harvested in favorable years. Some of the smaller trees are used as Christmas trees. Some juniper is used for fenceposts and firewood. Suitable management practices are those that help to maintain or improve the stands of trees as well as the understory plant cover and to reduce erosion. Thinning and selective harvesting of trees and proper grazing use improve stands of timber and the understory plant cover. Capability subclass VIIe, nonirrigated.

30—Hocar-Rock outcrop complex, 15 to 30 percent slopes, eroded. This moderately steep complex is on moderately long, narrow ridges and sides of low mountains. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 75 percent Hocar very gravelly loam and 15 percent Rock outcrop. The Hocar soil is on

west- and south-facing side slopes. Rock outcrop is mainly on ridges and is scattered throughout areas of the Hocar soil.

Included with this complex in mapping are some small areas of Incy and Xerta soils and a soil that is similar to this Hocar soil but is deeper and is on north-facing side slopes. Included soils make up about 10 percent of the total acreage.

The Hocar soil is shallow and well drained. It formed in residuum from metasedimentary rock. Typically, the surface layer is gray very gravelly loam about 3 inches thick. The next layer is light brownish gray very gravelly loam about 4 inches thick. Metasedimentary bedrock is at a depth of about 7 inches.

Permeability of this Hocar soil is moderate. Effective rooting depth is about 7 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

Rock outcrop consists of barren exposures of rock. In places a few inches of soil material covers the rock.

This complex is used mainly for livestock grazing, wildlife habitat, and watershed.

The native vegetation on the Hocar soil consists of a few scattered singleleaf pinyon and Utah juniper and an understory of big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by shallow depth, very low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and to reduce erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is very poor for woodland wildlife habitat. The complex provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

31—Holbrook gravelly fine sandy loam, 4 to 8 percent slopes. This deep, well drained, moderately sloping soil is on alluvial fans. It formed in mixed alluvium mainly from granitic and metavolcanic rock. Elevation is about 5,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 48 to 51 degrees F, and the frost-free season is 90 to 110 days.

Typically, the surface layer is gray gravelly fine sandy loam about 9 inches thick. Below this to a depth of 60 inches is brown, stratified stony sand to very gravelly loam.

Included with this soil in mapping are some small areas of Jubilee soils and some areas of soils that have a stony surface layer. Included soils make up less than 10 percent of the total acreage.

Permeability of this Holbrook soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is low. Surface runoff is slow, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used for irrigated crops, livestock grazing, openland and rangeland wildlife habitat, and urban land.

The native vegetation is big sagebrush and grasses.

Where this soil is irrigated, production of hay and pasture is good. Irrigation water is applied mainly by the contour ditch method. Drop structures are needed for better control of the water and for control of erosion. Use of the proper irrigation system and management of irrigation water help to prevent excessive water loss and to control erosion.

The potential is fair for livestock grazing. This soil is limited for this use by droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for openland and rangeland wildlife habitat. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development, sanitary facilities, and recreational development. Dwellings need to be protected from flooding. If density of housing is moderate to high, a community sewage system is needed to prevent contamination of water supplies. If this soil is used for recreational development, measures must be taken to control soil blowing and dustiness and to remove small stones from the surface. Capability subclasses IIIe, irrigated, and VIs, nonirrigated.

32—Holbrook very stony fine sandy loam, 4 to 15 percent slopes. This deep, well drained, moderately sloping to strongly sloping soil is on alluvial fans. It formed in mixed alluvium mainly from granitic and metavolcanic rock. Elevation ranges from 5,000 to 5,400 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 90 to 110 days.

Typically, the surface layer is grayish brown very stony fine sandy loam about 12 inches thick. Below this to a depth of 60 inches is brown, stratified stony sand to very gravelly loam.

Included with this soil in mapping are small areas of soils that are extremely stony and small areas of soils that have been cleared of stones. Included soils make up less than 10 percent of the total acreage.

Permeability of this Holbrook soil is moderately rapid. Effective rooting depth is 60 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used for livestock grazing, rangeland wildlife habitat, and urban development.

The native vegetation is big sagebrush and grasses.

The potential is fair for livestock grazing. The soil is limited for this use by droughtiness and the very stony surface layer. Suitable management practices are those that help to maintain or improve the plant cover and to

control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides food and cover for mule deer, coyote, cottontail rabbit, chukar, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of the livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities. Houses and access roads should be designed to minimize cuts that increase the hazard of erosion. If density of housing is moderate to high, community sewage disposal systems are needed to prevent contamination of water supplies and a hazard to health. Capability subclass VIs, nonirrigated.

33—Holbrook Variant-Rock outcrop complex, 30 to 75 percent slopes. This steep to very steep complex is on mountains and hills. Areas are irregular in shape. Elevation ranges from 5,000 to 6,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 48 degrees F, and the frost-free season is 90 to 110 days.

This complex is about 60 percent Holbrook Variant very stony fine sandy loam and 20 percent Rock outcrop. The Holbrook Variant soil has undulating, convex slopes and is on all aspects. Rock outcrop is mainly on ridges and is scattered throughout areas of the Holbrook Variant soil.

Included with this complex in mapping are some areas of soils that are similar to this Holbrook Variant soil but are deep. Also included are areas of Rubble land and some areas of a nearly level cobbly sand. Included areas make up about 20 percent of the total acreage.

The Holbrook Variant soil is moderately deep and well drained. It formed in colluvium from basalt and is underlain by basalt and rhyolite. Typically, the surface layer is light brownish gray very stony fine sandy loam about 8 inches thick. The next layer is pale brown very gravelly fine sandy loam about 16 inches thick. Bedrock is at a depth of 24 inches.

Permeability of the Holbrook Variant soil is moderately rapid. Effective rooting depth is 24 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is moderate.

Rock outcrop is mainly barren exposures of rock. In places a few inches of soil material covers the rock.

This complex is used for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on this complex is mainly big sagebrush and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by steepness of slope, the very stony surface, and the Rock outcrops. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The complex provides food and cover for mule deer, coyote, rabbit, and chukar. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of the livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

34—Incy fine sand, 4 to 30 percent slopes. This deep, excessively drained, moderately sloping to moderately steep soil is on alluvial fans and rolling terraces. It formed in eolian sand that is derived from mixed rock sources but dominantly from granite. Elevation ranges from 4,500 to 5,000 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 49 to 52 degrees F, and the frost-free season is 100 to 110 days.

Typically, the profile is pale brown fine sand to a depth of more than 60 inches.

Included with this soil in mapping are some small areas of Rock outcrop and some areas of Toll soils. Included soils make up less than 10 percent of the total acreage.

Permeability of this Incy soil is very rapid. Effective rooting depth is 60 inches. Available water capacity is low. Surface runoff is very slow, and the hazard of erosion is slight. The hazard of soil blowing is high.

This soil is used for livestock grazing and rangeland wildlife habitat.

The native vegetation is antelope bitterbrush, Anderson peachbrush, and grasses.

This soil is poorly suited to crops, because irrigation water is not available and the available water capacity is low.

The potential is poor for livestock grazing. The soil is limited for this use by droughtiness and the high hazard of erosion. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to improve the plant cover and increase the production of forage.

The potential is very poor for rangeland wildlife habitat. This soil provides some food and cover for mule deer, coyote, chukar, grouse, quail, and cottontail rabbit. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development, sanitary facilities, and recreational development. Excavation for houses and access roads in places exposes sand that is very susceptible to soil blowing. If density of housing is moderate to high, community sewage systems are needed. Onsite sewage disposal systems are a hazard to health because of seepage to lower lying areas. Areas used for recreation can be protected from soil blowing and dustiness by planting grass and shrubs. Capability subclass VIIs, nonirrigated.

35—Indiano Variant gravelly fine sandy loam, 4 to 15 percent slopes. This moderately deep, well drained, moderately sloping to strongly sloping soil is on uplands. It formed in alluvium derived mainly from metavolcanic and volcanic rock. Elevation ranges from 4,600 to 5,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray gravelly fine sandy loam about 11 inches thick. The next layer is yellowish brown gravelly clay loam about 18 inches thick. Bedrock is at a depth of 29 inches.

Included with this soil in mapping are some areas of Haybourne soils, some areas of a soil that is similar to this Indiano Variant soil but is shallow, and some areas of scattered Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Indiano Variant soil is moderately slow. Effective rooting depth is about 29 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used for livestock grazing, rangeland wildlife habitat, and urban development.

The native vegetation is big sagebrush, antelope bitterbrush, and desert needlegrass.

The potential is fair for livestock grazing. The soil is limited for this use mainly by the very low available water capacity and low precipitation. Suitable management practices are those that help to maintain the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides very limited food and cover for mule deer, chukar, quail, cottontail rabbit, and coyote. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Grazing management practices applied for livestock will improve the plant cover and increase the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities, and poor for recreational development. The soil is limited for these uses by slope, shallow depth, and dustiness. Houses and access roads need to be designed so that excavation for them does not expose bedrock. If density of housing is moderate to high, community sewage systems are needed. Capability subclass VIIs, nonirrigated.

36—Jubilee coarse sandy loam, 0 to 2 percent slopes. This deep, poorly drained soil is on nearly level flood plains. It formed in alluvium from mixed rock. Elevation ranges from 4,500 to 4,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is dark grayish brown coarse sandy loam about 20 inches thick. Below this to a depth of 60 inches is grayish brown and light brownish gray, stratified coarse sand to sandy loam.

Included with this soil in mapping are some small areas of Jubilee soils that have a surface layer of sand 3 to 6 inches thick and of a soil that is similar to this Jubilee soil but is calcareous and slightly saline-affected. Included soils make up less than 10 percent of the total acreage.

Permeability of this Jubilee soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight. The water table is at a depth of 1 foot to 2 feet. This soil is rarely flooded.

This soil is used mainly for pasture, meadow hay, and wildlife habitat. Some areas are being urbanized.

The native vegetation is mainly sedge, rush, clover, and grasses.

The potential is fair for pasture and meadow hay. This soil is capable of producing about 10 animal units of forage per acre per month. Suitable management practices are those, such as irrigation water management, that prevent the raising of the water table. Pasture and hayland management and a planned grazing system improve the plant cover and increase the production of forage.

The potential is good for wetland wildlife habitat and fair for openland wildlife habitat. This soil provides limited food and cover for mule deer, cottontail rabbit, and quail during part of the year. Some ducks and geese use the area in winter. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. The soil is limited for these uses by a hazard of flooding, wetness, and seepage. Drainage is needed to lower the water table before the construction of buildings, and protection from flooding is required after they have been built. Septic tank absorption fields may not function and are a hazard to health because contamination of the ground water can affect others downstream. Community sewage systems are needed. Drainage is needed if this soil is developed for recreation. Capability subclass IIIw, irrigated.

37—Jubilee sandy loam, 2 to 4 percent slopes. This deep, poorly drained, gently sloping soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation ranges from 4,600 to 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is dark gray sandy loam about 12 inches thick. The underlying material to a depth of 60 inches is light grayish brown, stratified coarse sand to sandy loam.

Included with this soil in mapping are some small areas of other Jubilee soils that have a loam surface layer and some small areas of soils that have slightly steeper slopes. Included soils make up less than 5 percent of the total acreage.

Permeability of this Jubilee soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is very slow,

and the hazard of erosion is slight. The water table is at a depth of 1 foot to 2 feet. This soil is rarely flooded.

This soil is used for pasture, meadow hay, and wildlife habitat. Some areas are being urbanized.

The native vegetation is meadow consisting of sedges, rush, clover, and grasses.

The soil is capable of producing about 10 animal units of forage per acre per month. Irrigation water must be managed so that the height of the water table is not raised. Management of pasture and hayland and use of a planned grazing system improve the plant cover and increase the production of forage.

The potential is good for wetland wildlife habitat and fair for openland wildlife habitat. This soil provides limited food and cover for mule deer, cottontail rabbit, and quail during part of the year. Some ducks and geese use the area in winter. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development and sanitary facilities. This soil is limited for these uses by the hazard of flooding, wetness, and seepage. Drainage is needed to lower the water table before the construction of dwellings, and protection from flooding is needed after construction. Community sewage systems are needed. Septic tank absorption fields may not function, and contamination of ground water is a hazard to health. Drainage is needed if recreational development is planned. Capability subclass IIIw, irrigated.

38—**Kimmerling silty clay loam.** This deep, poorly drained, nearly level soil is on narrow flood plains. It formed in mixed alluvium. Slope ranges from 0 to 2 percent. Elevation ranges from 4,500 to 4,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 90 to 100 days.

Typically, the surface layer is dark gray and grayish silty clay loam about 25 inches thick. The underlying material to a depth of 60 inches is stratified brown, dark gray, pale olive, and light olive gray silty clay loam to silt loam and is mottled in the lower part.

Included with this soil in mapping are some areas of soils that are similar to this Kimmerling soil but that are calcareous throughout and are slightly saline-alkali affected. Included soils make up less than 5 percent of the total acreage.

The permeability of this Kimmerling soil is moderately slow. Effective rooting depth is about 60 inches. Available water capacity is high. Surface runoff is very slow, and the hazard of erosion is slight. The water table is at a depth of 1 to 2 feet. Flooding is common and is sometimes of long duration.

This soil is used for pasture, livestock grazing, and wildlife habitat.

Native vegetation is meadow consisting of sedges, rush, native clover, and meadow grasses.

Areas that are not subject to flooding are seeded for pasture. Production of seeded pasture or grass hay is fair. Irrigation water must be managed so that the height of the water table is not raised. Use of dikes and diversions helps to control flooding. Areas of this soil that are commonly flooded are used for native pasture. Suitable management practices are those that help to maintain or improve the plant cover and control flooding. Planned grazing systems and grazing only when the surface is dry help to prevent deterioration of the soil.

The potential is good for wetland wildlife habitat. This soil provides food and cover for a limited number of mule deer, cottontail rabbit, and quail during part of the year. Some ducks and geese use the area in winter. Management practices that improve the pasture and hayland also improve the plant cover and increase the production of forage suitable for wildlife. Capability subclass IIIw, irrigated.

39—**Koontz-Rock outcrop complex, 30 to 50 percent slopes.** This steep complex is on mountainsides. Areas are irregular in shape. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent very gravelly loam and about 15 percent Rock outcrop. The Koontz soil is on east-, south-, and west-facing side slopes. Rock outcrop is mainly on ridges, but in places it is on side slopes.

Included with this complex in mapping are some areas of Sutro and Holbrook soils. Also included are small areas of talus. Included areas make up about 15 percent of the total acreage.

The Koontz soil is shallow and well drained. It formed in colluvium and residuum from metavolcanic rock. The surface layer is grayish brown very gravelly loam about 9 inches thick. The next layer is brown very gravelly clay loam about 5 inches thick. Weathered metavolcanic bedrock is at a depth of 14 inches.

Permeability of this Koontz soil is moderately slow. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

Rock outcrop consists mainly of metavolcanic rock, but in places it is basalt and andesite. In some places it is covered by a few inches of soil material.

This complex is used for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation is mainly singleleaf pinyon and Utah juniper. Where the canopy is open, the understory is big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The Koontz soil is shallow, has low available water capacity, and is droughty. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices improve the plant cover and increase the production of forage.

The potential is poor for woodland wildlife habitat. This complex provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or

improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. The complex is used mainly for the production of firewood and fenceposts. Pinyon pine nuts are harvested in favorable years, and some Christmas trees are cut for local use in most years. The complex is capable of producing about 2 cords of wood per acre when the trees in the stand average 5 inches in diameter at a height of 1 foot. Capability subclass VIIe, nonirrigated.

40—Koontz-Sutro complex, 15 to 30 percent slopes. This moderately steep complex is on rolling uplands and on the sides of low mountains. Elevation ranges from 5,500 to 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 60 percent Koontz very gravelly loam and about 20 percent Sutro very stony loam. The Koontz soil is on slightly convex, south- and west-facing side slopes. The Sutro soil is on slightly concave side slopes.

Included with this complex in mapping are some small areas of Rock outcrop and some areas of soils that are similar to these soils but are steeper. Also included are some areas of Surprise soils that are slightly less sloping than this Koontz soil. Included areas make up about 20 percent of the total acreage.

The Koontz soil is shallow and well drained. It formed in colluvium and residuum from metavolcanic rock. Typically, the surface layer is grayish brown very gravelly loam about 9 inches thick. The next layer is brown very gravelly clay loam about 5 inches thick. Weathered metavolcanic bedrock is at a depth of about 14 inches.

Permeability of this Koontz soil is moderately slow. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

The Sutro soil is moderately deep and well drained. It formed in colluvium from metavolcanic rock. Typically, the surface layer is brown very stony loam about 6 inches thick. The next layer is brown and brownish yellow gravelly loam about 18 inches thick. Weathered metavolcanic bedrock is at a depth of 24 inches.

Permeability of this Sutro soil is moderate. Effective rooting depth is about 24 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

This complex is used for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation is singleleaf pinyon, Utah juniper, and an understory of big sagebrush, antelope bitterbrush, and squirreltail.

The potential is poor for livestock grazing. The complex is limited for this use by moderately steep slopes, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor to fair for woodland wildlife habitat. The complex provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. The complex is used mainly for the production of firewood and fenceposts. Singleleaf pinyon nuts are harvested in favorable years, and some Christmas trees are cut for local use in most years. The complex is capable of producing about 2 cords of wood per acre when the trees in the stand average 5 inches in diameter at a height of 1 foot. Capability subclass VIIs, nonirrigated.

41—Koontz-Sutro complex, 30 to 50 percent slopes. This steep complex is on low mountains. Slopes are short. Elevation ranges from 5,000 to 5,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 60 percent Koontz extremely stony loam, about 25 percent Sutro very stony loam, and about 10 percent Rock outcrop. The Koontz soil is on the west-, south-, and east-facing side slopes. The Sutro soil is on north-facing side slopes. Rock outcrop is scattered throughout areas of both soils.

Included with this complex in mapping are some areas of Incy and Haybourne soils on small alluvial fans. Included soils make up about 5 percent of the total acreage.

The Koontz soil is shallow and well drained. It formed in colluvium and residuum derived from metavolcanic rock. Typically, the surface layer is grayish brown extremely stony loam about 4 inches thick. The next layer is brown very gravelly loam about 5 inches thick. Weathered metavolcanic bedrock is at a depth of about 9 inches.

Permeability of the Koontz soil is moderately slow. Effective rooting depth is about 9 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

The Sutro soil is moderately deep and well drained. It formed in colluvium from metavolcanic rock. Typically, the surface layer is brown very stony loam about 6 inches thick. The next layer is brown gravelly loam about 18 inches thick. Weathered metavolcanic bedrock is at a depth of 24 inches.

Permeability of the Sutro soil is moderate. Effective rooting depth is about 24 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

Rock outcrop is mostly barren exposures of metavolcanic rock. It occurs mostly along ridges.

This complex is used mainly for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation is singleleaf pinyon, Utah juniper, and an understory of big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by steep slopes, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor to fair for woodland wildlife habitat. The complex provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. This complex is used mainly for the production of firewood and fenceposts. Singleleaf pinyon nuts are harvested in favorable years, and some Christmas trees are cut for local use in most years. This complex is capable of producing about 2 cords of wood per acre when the trees in the stand average 5 inches in diameter at a height of 1 foot. Capability subclass VIIs, nonirrigated.

42—Koontz-Sutro Variant association, moderately steep. This association is on low hills. Areas are irregular in shape. Elevation ranges from 5,000 to 5,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This association is about 65 percent Koontz very stony loam that has slopes of 15 to 30 percent and about 20 percent Sutro Variant very stony loam that has slopes of 30 to 50 percent. The Koontz soil is on the west-, south-, and east-facing side slopes. The Sutro Variant soil is on the north-facing side slopes.

Included with this association in mapping are some areas of Incy soils, a soil that is similar to this Koontz soil but is moderately deep, and very shallow soils. Included soils make up about 15 percent of the total acreage.

The Koontz soil is shallow and well drained. It formed in colluvium and residuum from metavolcanic rock. Typically, the surface layer is grayish brown very stony loam about 9 inches thick. The next layer is brown very gravelly loam about 5 inches thick. Weathered metavolcanic rock is at a depth of 14 inches.

Permeability of the Koontz soil is moderately slow. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

The Sutro Variant soil is deep and well drained. It formed in residuum from metavolcanic rock. Typically, the surface layer is grayish brown very stony loam about 9 inches thick. The next layer is pale brown loam about 42 inches thick. Weathered metavolcanic rock is at a depth of 51 inches.

Permeability of the Sutro Variant soil is moderate. Effective rooting depth is about 51 inches. Available water capacity is high. Surface runoff is medium, and the hazard of erosion is moderate.

This association is used mainly for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on the Koontz soil is mainly big sagebrush and grasses. The native vegetation on the Sutro Variant soil is mainly big sagebrush, antelope bitterbrush, and grasses.

This association is limited for livestock grazing by slope, a very stony surface layer, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair to poor for rangeland wildlife habitat. The association provides some food and cover for mule deer, coyote, chukar, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing helps to improve the plant cover and increase the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

43—Koontz-Sutro Variant association, steep. This association is on low hills. Areas are irregular in shape. Elevation ranges from 5,000 to 5,500 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This association is about 65 percent Koontz very stony loam that has slopes of 30 to 50 percent and about 20 percent Sutro Variant very stony loam that has slopes of 50 to 75 percent. The Koontz soil is on the west-, south-, and east-facing side slopes. The Sutro Variant soil is on north-facing side slopes.

Included with this association in mapping are some areas of Rock outcrop and a soil that is similar to this Koontz soil but is moderately deep. Included areas make up about 15 percent of the total acreage.

The Koontz soil is shallow and well drained. It formed in colluvium and residuum from metavolcanic rock. Typically, the surface layer is grayish brown very stony loam about 9 inches thick. The next layer is brown very gravelly loam about 5 inches thick. Weathered metavolcanic bedrock is at a depth of about 14 inches.

Permeability of this Koontz soil is moderately slow. Effective rooting depth is about 14 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

The Sutro Variant soil is deep and well drained. It formed in residuum from metavolcanic rock. Typically, the surface layer is grayish brown very stony loam about 9 inches thick. The next layer is pale brown and yellowish brown gravelly loam about 42 inches thick. Weathered metavolcanic bedrock is at a depth of 51 inches.

Permeability of the Sutro Variant soil is moderate. Effective rooting depth is about 51 inches. Available water capacity is high. Surface runoff is medium, and the hazard of erosion is moderate.

This association is used mainly for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on the Koontz soil is big sagebrush and grasses. The native vegetation on the Sutro Variant soil is big sagebrush, antelope bitterbrush, and grasses.

This association is limited for livestock grazing by steep to very steep slopes, a very stony surface layer, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair to poor for rangeland wildlife habitat. The association provides food and cover for mule deer, coyote, chukar, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

44—McFaul sand, 2 to 8 percent slopes. This deep, well drained, gently sloping to moderately sloping soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,700 feet. The average annual precipitation is about 10 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is pale brown and grayish brown sand and loamy sand about 11 inches thick. The next layer is grayish brown, brown, and yellowish brown gravelly sandy loam about 17 inches thick. Below this to a depth of 60 inches is yellowish brown, stratified sandy loam, loamy sand, and sand.

Included with this soil in mapping are several small areas of soils that are stony and occur along drainageways. These soils make up less than 5 percent of the total acreage.

Permeability of this McFaul soil is moderately slow. Effective rooting depth is 60 inches. Available water capacity is moderately high. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used for livestock grazing and rangeland wildlife habitat. Some areas near Carson City may be urbanized in the future.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. This soil is limited for this use by the sandy surface layer and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. This soil provides food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing helps to improve the plant cover and increase the production of forage suitable for wildlife.

The potential for community development is fair. Excavation for houses and access roads in places increases the hazard of erosion. Community sewage systems are needed in areas where septic tank absorption fields do not function properly and are a hazard to health. Recreational areas that are leveled can be protected from soil blowing and water erosion by planting grasses and shrubs. Capability subclass VIs, nonirrigated.

45—Mottsville loamy coarse sand, 2 to 4 percent slopes. This deep, excessively drained, gently sloping soil is on toe slopes of alluvial fans. It formed in alluvium mainly from granitic rock. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown loamy coarse sand about 24 inches thick. Below this to a depth of 60 inches is light brownish gray gravelly loamy coarse sand.

Included with this soil in mapping are some small areas of soils that have a coarse sandy loam surface layer and some narrow stream channels. Included areas make up less than 5 percent of the total acreage.

Permeability of this Mottsville soil is rapid. Effective rooting depth is 60 inches. Available water capacity is low. Surface runoff is very slow, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used mainly for livestock grazing and rangeland wildlife habitat. It is being urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. The soil is limited for this use by sandy texture, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. The soil provides food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing helps to improve the plant cover and increase the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities. Excavation for houses and access roads increases the hazard of erosion in places. Channels and outlets can be used to protect dwellings from flooding. Septic tank absorption fields are a hazard to health because of seepage. If density of housing is

moderate to high, community sewage systems are needed. Areas used for recreation can be planted to grass and shrubs to control soil blowing and erosion. Capability subclass VIIs, nonirrigated.

46—Old Camp-Holbrook Variant association. This moderately steep to steep association is on uplands. Elevation ranges from 5,700 to 5,900 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 50 degrees F, and the frost-free season is 90 to 110 days.

This association is about 65 percent Old Camp very stony loam that has slopes of 15 to 30 percent and about 20 percent Holbrook Variant very stony fine sandy loam that has slopes of 30 to 50 percent. The Old Camp soil is on the south- and west-facing side slopes. The Holbrook Variant soil is on the north-facing side slopes.

Included with this soil in mapping are some areas of very shallow Old Camp soils, some areas of Rock outcrop along the ridges, and areas of a very deep soil in small swales. Included areas make up about 15 percent of the total acreage.

The Old Camp soil is shallow and well drained. It formed in residuum from basalt and andesite. Typically, the surface layer is light brownish gray very stony loam about 5 inches thick. The next layer is pinkish gray very stony clay loam about 6 inches thick. Creviced andesitic bedrock is at a depth of 11 inches.

Permeability of the Old Camp soil is moderately slow. Effective rooting depth is about 11 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is slight.

The Holbrook Variant soil is moderately deep and well drained. It formed in colluvium from igneous rock. Typically, the surface layer is light brownish gray very stony fine sandy loam about 8 inches thick. The next layer is pale brown very gravelly fine sandy loam about 16 inches thick. Basaltic bedrock is at a depth of 24 inches.

Permeability of the Holbrook Variant soil is moderately rapid. Effective rooting depth is about 24 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

This association is used for livestock grazing and rangeland wildlife habitat.

The native vegetation on the Old Camp soil is big sagebrush, Sandberg bluegrass, and squirreltail. The native vegetation on the Holbrook Variant soil is big sagebrush, green ephedra, and squirreltail.

The potential is poor for livestock grazing. The association is limited for this use by the moderately steep to steep slopes, the very stony surface, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The association provides food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

47—Old Camp-Rock outcrop complex, 8 to 15 percent slopes. This strongly sloping complex is on hilly uplands. Elevation ranges from 5,000 to 5,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 50 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 70 percent Old Camp very stony loam and about 20 percent Rock outcrop. The Old Camp soil is shallow over bedrock and is mostly in small, scattered areas on south-facing side slopes. Rock outcrop is mostly along ridges, but some areas are on side slopes.

Included with this soil in mapping are some small areas of a deep loamy soil in swales and some loess deposits. Included areas make up about 10 percent of the total acreage.

The Old Camp soil is shallow and well drained. It formed in residuum from igneous rock. Typically, the surface layer is light brownish gray very stony loam about 5 inches thick. The next layer is pinkish gray very stony clay loam about 6 inches thick. Bedrock is at a depth of 11 inches.

Permeability of this Old Camp soil is moderately slow. Effective rooting depth is about 11 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

Rock outcrop is generally barren exposures of rock. In places it is covered by a few inches of soil material.

This complex is used mainly for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on this complex is big sagebrush and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by shallow depth, very low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The complex provides food and cover for mule deer, coyote, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

48—Old Camp-Rubble land complex, 15 to 30 percent slopes. This moderately steep complex is on the sides of a large cinder cone. Elevation ranges from 6,400 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 50 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 40 percent Old Camp very stony loam and about 20 percent Rubble land. The Old Camp soil is mostly on south-facing side slopes. Rubble land is scattered throughout areas of the Old Camp soil.

Included with this complex in mapping are areas of Xerta, Deven, Holbrook Variant, and Oppio soils. Also included is a large excavation on the cinder cone. Included areas make up about 40 percent of the total acreage.

The Old Camp soil is shallow and well drained. It formed in residuum from igneous rock. The surface layer is light brownish gray very stony loam about 5 inches thick. The next layer is pinkish gray very stony clay loam about 6 inches thick. Igneous rock is at a depth of 11 inches.

Permeability of the Old Camp soil is moderately slow. Effective rooting depth is about 11 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is slight.

Rubble land consists of areas where more than 90 percent of the surface is covered with stones and boulders.

This complex is used for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on this Old Camp soil is big sagebrush and Thurber needlegrass. Rubble land has a very sparse cover of big sagebrush and grasses.

The potential is poor for livestock grazing. The complex is limited for this use by shallow depth, very low available water capacity, and droughtiness. Rubble land cannot be grazed. Management practices that can be used to maintain the plant cover are very limited. Light grazing by livestock for only short periods helps to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. The complex provides some food and cover for mule deer, coyote, and chukar. Management practices that can be used to maintain the habitat for these wildlife species are very limited. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

49—Oppio-Nosrac association. This association consists of steep soils on uplands and mountains. Elevation ranges from 5,700 to 6,200 feet. The average annual precipitation is 10 to 16 inches. The average annual air temperature is 45 to 50 degrees F, and the frost-free season is 80 to 110 days.

This association is about 60 percent Oppio very stony fine sandy loam that has slopes of 30 to 50 percent and about 20 percent Nosrac stony clay loam that has slopes of 30 to 50 percent. The Oppio soil is on south-facing side slopes that are slightly convex. The Nosrac soil is on north-facing side slopes.

Included with this association in mapping are some areas of Deven soils and areas of a soil that is similar to this Oppio soil but is redder. Also included are some areas of Rock outcrop of andesite, rhyolite, and flow breccia and areas of a deep soil on short alluvial fans. Included areas make up about 20 percent of the total acreage.

The Oppio soil is moderately deep and well drained. It formed in residuum from andesite rock. Typically, the surface layer is light brownish gray very stony fine sandy loam about 6 inches thick. The next layer is brown very gravelly clay about 21 inches thick. Highly fractured andesitic bedrock is at a depth of 27 inches.

Permeability of the Oppio soil is slow. Effective rooting depth is about 27 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is moderate.

The Nosrac soil is deep and well drained. It formed in material weathered from andesite and schist. Typically, the surface layer is grayish brown stony clay loam about 9 inches thick. The next layer is brown very gravelly clay loam about 25 inches thick. Below this to a depth of 60 inches is olive very gravelly loam.

Permeability of the Nosrac soil is moderately slow. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is moderate.

This association is used for livestock grazing, rangeland wildlife habitat, and watershed.

The native vegetation on the Oppio soil is big sagebrush, desert needlegrass, and some scattered singleleaf pinyon and Utah juniper. The native vegetation on the Nosrac soil is big sagebrush, Thurber needlegrass, Nevada bluegrass and an overstory of singleleaf pinyon and Utah juniper.

The potential is poor for livestock grazing. The association is limited for this use by steep slopes and a stony surface. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland and woodland wildlife habitat. The association provides food and cover for mule deer, coyote, chukar, grouse, and quail. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

50—Orizaba loam, saline-alkali. This deep, somewhat poorly drained, saline-alkali affected soil is on flood plains. It formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is about 10 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is very pale brown loam about 9 inches thick. The next layer to a depth of 60 inches is pale brown and light gray stratified silty clay loam to sand.

Included with this soil in mapping are some areas of Kimmerling and Bishop soils and of a soil that is similar to this Orizaba soil but has slow permeability. Included soils make up less than 10 percent of the total acreage.

Permeability of this Orizaba soil is moderately slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is slow, and the hazard of erosion is slight. The water table is at a depth of 2.5 to 3.5 feet. Flooding is rare to common. Salinity is moderate in the surface layer and slight in the lower part of the profile.

This soil is used mainly for pasture and wildlife habitat. Some areas have been urbanized.

The native vegetation is mainly meadow grasses, black greasewood, and rubber rabbitbrush.

The potential is poor for livestock grazing. This soil is grazed mainly in fall and winter. It is irrigated by flooding, usually in spring when there is ample water. Suitable management practices are those that help to maintain or improve the plant cover. Irrigation water management, proper pasture management, and a planned grazing system help to maintain and improve the plant cover and the production of forage.

The potential is fair for wetland wildlife habitat. This soil provides food and cover for ducks and geese in winter. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities and fair for recreational development. Drainage systems, such as channels and outlets, need to be installed to lower the water table. Protection of dwellings from flooding must be provided. Septic tank absorption fields are a hazard to health because of contamination of the ground water. Community sewage systems are needed if dwellings are constructed. Recreational areas can be planted to grass and shrubs to reduce dustiness when the surface is dry. Capability subclass VIIw, nonirrigated.

51—Prey gravelly loamy sand, 0 to 4 percent slopes. This moderately deep, well drained soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light gray and grayish brown gravelly loamy sand about 13 inches thick. The next layer is brown and yellowish brown gravelly coarse sandy loam about 17 inches thick. The next layer is a very pale brown, strongly cemented hardpan about 5 inches thick. Below this to a depth of 60 inches is light gray and very pale brown loamy coarse sand.

Included with this soil in mapping are areas of a Prey gravelly loamy sand that has slopes of as much as 16 percent. These areas are on sides of terraces. Included areas make up less than 5 percent of the total acreage.

Permeability of this Prey soil is moderately rapid above the hardpan. Effective rooting depth is about 30 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used mainly for livestock grazing and wildlife habitat. Some areas are being urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, Douglas rabbitbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is very poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, and quail. Suitable management practices are those that help to maintain the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for most community developments and sanitary facilities. Excavation for roads and dwellings increases the hazard of erosion in places. Septic tank absorption fields are a hazard to health because of seepage. If density of housing is moderate to high, community sewage systems are needed. The hardpan is rippable and is therefore not a limitation for most engineering uses of this soil. Areas used for recreation can be planted to grass and shrubs to reduce soil blowing. Capability subclass VIIs, nonirrigated.

52—Prey fine sandy loam, gravelly substratum, 4 to 8 percent slopes. This moderately deep, well drained soil is on narrow alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray fine sandy loam about 3 inches thick. The next layer is pale brown sandy loam about 30 inches thick. The next layer is a strongly cemented hardpan about 3 inches thick. Below this to a depth of 60 inches is light gray very gravelly loamy sand that has weakly cemented layers of hardpan.

Included with this soil in mapping are some areas of a Prey gravelly sandy loam that has slopes of 8 to 15 percent and a very gravelly soil that has slopes of as much as 30 percent. Included soils make up less than 10 percent of the total acreage.

Permeability of this Prey soil is moderately rapid above the hardpan. Effective rooting depth is about 33 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is moderate.

The native vegetation is big sagebrush, antelope bitterbrush, Douglas rabbitbrush, and grasses.

This soil is used mainly for livestock grazing and wildlife habitat. Some areas are being urbanized.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and to control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, quail, and chukar. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for most community developments and sanitary facilities. Excavation for roads and houses should be carefully planned to prevent exposing large areas to erosion. Septic tank absorption fields are a hazard to health because of seepage. If density of housing is moderate or high, community sewage systems are needed. The hardpan is rippable and therefore is not a limitation for most engineering uses of this soil. Capability subclass VIIs, nonirrigated.

53—Prey gravelly fine sandy loam, gravelly substratum, 8 to 15 percent slopes. This moderately deep, well drained soil is on small, narrow alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray gravelly fine sandy loam about 3 inches thick. The next layer is pale brown sandy loam about 30 inches thick. The next layer is a strongly cemented hardpan about 3 inches thick. Below this to a depth of 60 inches is light gray very gravelly loamy sand that has weakly cemented layers of hardpan throughout.

Permeability of this Prey soil is moderately rapid above the hardpan. Effective rooting depth is about 33 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for livestock grazing and rangeland wildlife habitat. Some areas are being urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, quail, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for most community developments and sanitary facilities. Excavation for roads and housing needs to be carefully planned to prevent exposing large areas to erosion. If density of housing is moderate or high, community sewage systems are needed. The hardpan is rippable and is therefore not a limitation for most engineering uses of this soil. Capability subclass VIIs, nonirrigated.

54—Reno cobbly fine sandy loam, 4 to 8 percent slopes. This moderately deep, well drained soil is on slightly undulating alluvial fans. It formed in alluvium from basaltic rock. Elevation is about 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 49 to 50 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown cobbly fine sandy loam about 3 inches thick. The next layer is dark brown to light gray clay and sandy clay about 21 inches thick. The next layer is a strongly cemented hardpan about 5 inches thick. Below this to a depth of 60 inches is light brownish gray, stratified gravelly and very gravelly loamy sand and sandy loam.

Included with this soil in mapping are some small areas of soils that have a surface layer of clay loam, some small areas of soils in small drainageways, and areas of soils that are similar to this Prey soil but have 12 to 18 inches of loess on the surface. Included areas make up less than 10 percent of the total acreage.

Permeability of this Reno soil is very slow. Effective rooting depth is about 24 inches. Available water capacity is low. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used for livestock grazing and rangeland wildlife habitat.

The native vegetation is big sagebrush, grasses, and some scattered singleleaf pinyon and Utah juniper.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. This soil provides food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

55—Reno gravelly clay loam, 0 to 4 percent slopes. This moderately deep, well drained soil is on smooth alluvial fans. It formed in alluvium from basaltic rock. Elevation is about 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown gravelly clay loam about 3 inches thick. The next layer is dark brown to light gray clay and sandy clay about 17 inches thick. The next layer is a strongly cemented hardpan about 9 inches thick. Below this to a depth of 60 inches is light brownish gray, stratified gravelly and very gravelly loamy sand and sandy loam.

Included with this soil in mapping are some small areas of Reno cobbly fine sandy loam, 4 to 8 percent slopes, and some areas of soils that have slopes of as much as 30 per-

cent. Included soils make up less than 10 percent of the total acreage.

Permeability of this Reno soil is very slow. Effective rooting depth is about 20 inches. Available water capacity is low. Surface runoff is slow, and the hazard of erosion is slight.

This soil is used for livestock grazing and rangeland wildlife habitat.

The native vegetation is low sagebrush and grasses and some scattered pinyon pine and juniper.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain and improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

56—Rock outcrop-Aldax Variant complex, 50 to 75 percent slopes. This very steep complex is on mountainsides. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 20 to 35 inches. The average annual air temperature is about 41 to 45 degrees F, and the frost-free season is less than 75 days.

This complex is about 60 percent Rock outcrop and 20 percent Aldax Variant very stony very fine sandy loam. Rock outcrop is on all aspects. The Aldax Variant soil is mainly on south-facing side slopes.

Included with this complex in mapping are small areas of Toiyabe soils and some areas of Vicee soils on north-facing side slopes. Included soils make up about 20 percent of the total acreage.

Rock outcrop is mainly barren exposures of metavolcanic rock, but in places a few inches of soil material covers the rock.

The Aldax Variant soil is shallow and well drained. It formed in residuum from metavolcanic rock. Typically, the surface layer is gray and grayish brown very stony very fine sandy loam about 5 inches thick. The next layer is light brownish gray very gravelly very fine sandy loam about 10 inches thick. Weathered metavolcanic bedrock is at a depth of 15 inches.

Permeability of the Aldax Variant soil is moderate. Effective rooting depth is about 15 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

This complex is used for limited livestock grazing, woodland, rangeland wildlife habitat, and watershed.

The native vegetation on this complex is Jeffrey pine and an understory of big sagebrush, antelope bitterbrush, and grasses. Where the tree canopy is closed, the understory plant cover is greatly reduced.

The potential is poor for livestock grazing. The complex is limited for this use by the very steep slopes, the very stony surface, and the hazard of erosion. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Restricting grazing or excluding livestock from this soil helps to maintain the production of forage.

The potential is very poor for woodland wildlife habitat. This complex provides some food and cover for mule deer and predators such as mountain lion, bobcat, and coyote. Some grouse and quail are in the area. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for woodland. The stand of Jeffrey pine is poor in quality and low in quantity because the soil is shallow and the slopes are very steep. Capability subclass VIIe, nonirrigated.

57—Sagouspe sand. This deep, somewhat poorly drained, slightly undulating soil is on flood plains. It formed in alluvium from mixed rock. Areas are small and irregular in shape. Slope ranges from 0 to 2 percent. Elevation is about 4,700 feet. The average annual precipitation is about 10 inches, the average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray to light gray sand about 10 inches thick. Below this to a depth of 60 inches is stratified dark grayish brown to light gray coarse sand to silt loam.

Included with this soil in mapping are some small areas of very gravelly soils, a soil that is sandy throughout the profile, and soils that are fine sandy loam throughout. Included soils make up about 10 percent of the total acreage.

Permeability of this Sagouspe soil is rapid. Effective rooting depth is 60 inches. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is high. The water table is at a depth of 3 and 5 feet most of the year. This soil is rarely flooded.

This soil is used mainly for livestock grazing and rangeland wildlife habitat. Small areas that are protected from flooding, cleared, and leveled are used for crops. Irrigation water must be managed to prevent raising of the water table.

The native vegetation is big sagebrush, saltgrass, a few poplar trees, and willows.

The potential is poor for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. This soil provides very limited food and cover for mule deer, coyote, cottontail rabbit, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIw, nonirrigated.

58—Surprise coarse sandy loam, 2 to 4 percent slopes. This deep, well drained soil is on alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is pale brown coarse sandy loam about 18 inches thick. The next layer is brown, stratified coarse sandy loam to gravelly loam about 19 inches thick. Below this to a depth of 60 inches is brown, stratified gravelly loamy sand to gravelly loam.

Included with this soil in mapping are small areas of soils that have a loamy sand surface layer about 5 inches thick and some areas of soils that are sandy throughout the profile. Included soils make up less than 10 percent of the total acreage.

Permeability of this Surprise soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is very slow, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used mainly for livestock grazing. Some areas adjacent to Carson City have been urbanized, and other areas are being rapidly urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat, although urbanization has forced most of the wildlife to seek food and cover in other areas.

The potential is fair to poor for most community developments and sanitary facilities. Excavation for roads and housing can expose large areas to erosion. Septic tank absorption fields are a hazard to health because of seepage. Community sewage systems are needed if density of housing is moderate or high. Areas used for recreation can be protected from soil blowing by planting grass and shrubs. Capability subclass VIs, nonirrigated.

59—Surprise coarse sandy loam, 4 to 8 percent slopes. This deep, well drained soil is on undulating alluvial fans. It formed in alluvium from mixed rock. Areas are small and irregular in shape. Slopes range from 4 to 8 percent. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is pale brown coarse sandy loam about 18 inches thick. The next layer is brown, stratified coarse sandy loam to gravelly loam about 19 inches thick. Below this to a depth of 60 inches is brown, stratified loamy sand to gravelly loam.

Included with this soil in mapping are small areas of soils that have a loamy sand surface layer and some areas of soils that have a stony surface layer. Also included is an area of soils that have a hardpan at a depth of 35 inches. Included soils make up about 10 percent of the total acreage.

Permeability of this Surprise soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used mostly for livestock grazing. Some areas adjacent to Carson City have been urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat, although urbanization has forced most of the wildlife to seek food and cover in other areas.

The potential is poor for most community developments and sanitary facilities. Excavation for roads and housing can expose large areas to erosion. Septic tank absorption fields are a hazard to health because of seepage. If density of housing is moderate or high, community sewage systems are needed. Capability subclass VIs, nonirrigated.

60—Surprise sandy loam, 8 to 15 percent slopes. This deep, well drained soil is in convex areas on alluvial fans. It formed in alluvium from mixed rock. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 50 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is brown sandy loam about 15 inches thick. The next layer is brown, stratified coarse sandy loam to gravelly loam about 22 inches thick. Below this to a depth of 60 inches is brown, stratified loamy sand to gravelly loam.

Included with this soil in mapping are some areas of soils that are similar to this Surprise soil but are slightly steeper and some areas of similar soils that have a loamy sand surface layer. Included areas make up less than 10 percent of the total acreage.

Permeability of this Surprise soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate. This soil is rarely flooded.

This soil is used mainly for livestock grazing. Some areas adjacent to Carson City have been urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential for rangeland wildlife habitat is fair, although urbanization has forced most of the wildlife to seek food and cover in other areas.

The potential is fair to poor for community development and sanitary facilities. Excavation for roads and houses can expose large areas to erosion. Septic tank absorption fields are a hazard to health because of seepage. If density of housing is moderate or high, community sewage systems are needed. Capability subclass VIIs, nonirrigated.

61—Surprise gravelly sandy loam, 0 to 2 percent slopes. This deep, well drained soil is on alluvial fans. It formed in alluvium from mixed rock. Areas are large and are irregular in shape. Elevation is about 4,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is about 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is brown gravelly sandy loam about 7 inches thick. The next layer is brown, stratified coarse sandy loam to gravelly loam about 33 inches thick. Below this to a depth of 60 inches is brown, stratified loamy sand to gravelly loam.

Included with this soil in mapping are some areas of soils that are similar to this Surprise soil but are very gravelly in the lower part of the profile and some areas of soils that have mottles below a depth of 45 inches. Included soils make up less than 10 percent of the total acreage.

Permeability of this Surprise soil is moderately rapid. Effective rooting depth is about 60 inches. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight. This soil is rarely flooded.

This soil is used for livestock grazing, rangeland wildlife habitat, and urban development. Areas adjacent to Carson City are largely urbanized.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for rangeland wildlife habitat. This soil provides food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair to poor for community development and sanitary facilities. Excavation for roads and houses exposes large areas to erosion. Dikes and channels with outlets protect buildings from flooding. Septic tank absorption fields also need protection from flooding. Septic tank absorption fields on this soil are a hazard to health because of seepage. If density of housing is moderate or high, community sewage systems are needed. Recreational areas can be planted to grass and shrubs to reduce dustiness. They should also be protected from flooding. Capability subclass VIs, nonirrigated.

62—Tarloc gravelly coarse sandy loam, 4 to 8 percent slopes. This moderately deep, well drained soil is on uplands. It formed in residuum mainly from granitic rock. Areas are small and are irregular in shape. Elevation ranges from 5,200 to 5,400 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 120 days.

Typically, the surface layer is brown and grayish brown gravelly coarse sandy loam about 8 inches thick. The next layer is brown gravelly coarse sandy loam about 14 inches thick. Weathered granitic bedrock is at a depth of 22 inches.

Included with this soil in mapping are some areas of Mottsville and Glenbrook soils and small areas of Rock outcrop. Included areas make up less than 10 percent of the total acreage.

Permeability of this Tarloc soil is moderate. Effective rooting depth is about 22 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

This soil is used for livestock grazing and rangeland wildlife habitat.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is fair for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIs, nonirrigated.

63—Tarloc-Glenbrook association. This moderately steep and steep association is on uplands. Areas are irregular in shape. Elevation ranges from 5,000 to 6,000 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 50 to 51 degrees F, and the frost-free season is 100 to 110 days.

This association is about 55 percent Tarloc gravelly coarse sandy loam that has slopes of 15 to 50 percent and about 30 percent Glenbrook gravelly loamy coarse sand that has slopes of 30 to 50 percent. The Tarloc soil is on hillsides. The Glenbrook soil is on west-facing side slopes and along the ridgetops.

Included with this association in mapping are some areas of Mottsville soils, areas of a soil that is similar to this Tarloc soil but is shallow, and some areas of Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Tarloc soil is moderately deep and well drained. It formed in residuum from granitic rock. Typically, the surface layer is brown and grayish brown gravelly coarse

sandy loam about 8 inches thick. The next layer is brown gravelly coarse sandy loam about 14 inches thick. Weathered granitic bedrock is at a depth of 22 inches.

Permeability of this Tarloc soil is moderate. Effective rooting depth is about 22 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high.

The Glenbrook soil is shallow and somewhat excessively drained. It formed in residuum from granitic rock. Typically, the surface layer is grayish brown and light brownish gray gravelly loamy coarse sand about 15 inches thick. Weathered granitic bedrock is at a depth of 15 inches.

Permeability of this Glenbrook soil is rapid. Effective rooting depth is about 15 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate.

This association is used for livestock grazing and rangeland wildlife habitat.

The native vegetation on this association is big sagebrush, antelope bitterbrush, and grasses.

The potential of this association is poor for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor to fair for rangeland wildlife habitat. This association provides food and cover for mule deer, coyote, cottontail rabbit, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Tarloc soil in capability subclass VIIe, nonirrigated, and Glenbrook soil in VIIs, nonirrigated.

64—Tarloc Variant coarse sandy loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on narrow foothills of mountains. It formed in residuum from granitic rock. Elevation ranges from 6,000 to 7,500 feet. The average annual precipitation is 20 to 35 inches. The average annual air temperature is 42 to 45 degrees F, and the frost-free season is 60 to 80 days.

Typically, the surface layer is light brownish gray and brown coarse sandy loam about 17 inches thick. The next layer is brown very gravelly coarse sandy loam about 15 inches thick. Weathered granitic bedrock is at a depth of about 32 inches.

Included with this soil in mapping are some areas of Corbett soils and of a soil that is similar to this Tarloc soil but is deep. Included soils make up less than 10 percent of the total acreage.

Permeability of this Tarloc soil is moderately rapid. Effective rooting depth is about 32 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is slight.

This soil is used for livestock grazing, rangeland and woodland wildlife habitat, woodland, watershed, and community development.

The native vegetation is Jeffrey pine and an understory of big sagebrush, antelope bitterbrush, and grasses. Where the tree canopy is closed, the understory vegetation is greatly reduced.

The potential is fair for livestock grazing. The soil is limited for this use by low available water capacity and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair for woodland wildlife habitat. This soil provides food and cover for mule deer, coyote, cottontail rabbit, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for the production of merchantable timber. The soil is limited for this use by droughtiness. The soil is capable of producing about 3,900 cubic feet, or 7,800 board feet (Scribner rule), per acre of merchantable Jeffrey pine from a fully stocked, even-aged stand of trees 100 years old. Depth to bedrock limits the production of Jeffrey pine.

The potential is fair to poor for community development, sanitary facilities, and recreational development. Excavation for roads and housing exposes large areas to erosion. Basements are difficult to excavate in places because of depth to bedrock. Septic tank absorption fields may not function properly and are a hazard to health because of seepage. If density of housing is moderate or high, community sewage systems are needed. Areas used for recreation can be protected from soil blowing by planting grass and shrubs. Capability subclass VIIs, nonirrigated.

65—Toem-Rock outcrop complex, 30 to 50 percent slopes. This steep complex is on the tops of the higher mountains. Elevation ranges from 8,500 to 9,500 feet. The average annual precipitation is 35 to 45 inches. The average annual air temperature is about 40 degrees F, and the frost-free season is 40 to 50 days.

This complex is about 70 percent Toem bouldery coarse sand and 20 percent Rock outcrop. The Toem soil is on all aspects of the mountains. Rock outcrop occurs mainly on ridges and dikes throughout areas of the Toem soil.

Included with this complex in mapping are some areas of Cagwin soils and of a deep sand on toe slopes. Included soils make up about 10 percent of the total acreage.

The Toem soil is shallow and excessively drained. It formed in residuum from granitic rock. Typically, the surface layer is grayish brown and brown bouldery coarse sand about 7 inches thick. The next layer is light brownish gray gravelly coarse sand about 10 inches thick. Weathered granitic bedrock is at a depth of 17 inches.

Permeability of this Toem soil is rapid. Effective rooting depth is about 17 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high.

Rock outcrop commonly is barren exposures of granitic rock. In some places a few inches of soil material covers the rock.

This complex is used mainly for woodland wildlife habitat, woodland, and watershed.

The native vegetation is California red fir, western white pine, and an understory of mountainmahogany, pinemat manzanita, snowbush, and some Thurber needlegrass.

The potential is poor for woodland wildlife habitat. The complex provides limited food and cover for mule deer, mountain lion, coyote, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Wildlife habitat can be further improved by providing watering facilities.

The potential is fair for the production of merchantable timber. The complex is limited for this use by depth to bedrock, boulders on the surface, and droughtiness, which influences the survival of seedlings. It is capable of producing about 10,550 cubic feet, or 65,700 board feet (Scribner rule), of merchantable timber per acre from a fully stocked, even-aged stand of trees 100 years old. Capability subclass VIIe, nonirrigated.

66—Toem-Rock outcrop complex, 50 to 75 percent slopes. This very steep complex is near the tops of the higher mountains. Elevation ranges from 9,000 to 9,500 feet. The average annual precipitation is 35 to 45 inches. The average annual air temperature is about 40 degrees F, and the frost-free season is 40 to 50 days.

This complex is about 60 percent Toem bouldery coarse sand and 30 percent Rock outcrop. The Toem soil is on all aspects of the mountains. Rock outcrop occurs mainly on ridges and as dikes throughout areas of the Toem soil.

Included with this complex in mapping are some areas of Cagwin soils and of a deep, very gravelly and sandy soil. Included soils make up about 10 percent of the total acreage.

The Toem soil is shallow and excessively drained. It formed in residuum from granitic rock. Typically, the surface layer is grayish brown and brown bouldery coarse sand about 7 inches thick. The next layer is light brownish gray gravelly coarse sand about 10 inches thick. Weathered granitic rock is at a depth of 17 inches.

Permeability of the Toem soil is rapid. Effective rooting depth is about 17 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high.

Rock outcrop is commonly barren exposures of granitic rock. In some places a few inches of soil material covers the rock.

This complex is used mainly for woodland wildlife habitat, woodland, and watershed.

The native vegetation is California red fir, western white pine, and an understory of mountainmahogany, pinemat manzanita, snowbush, and some Thurber needlegrass.

The potential is poor for woodland wildlife habitat. The complex provides limited food and cover for mule deer, mountain lion, coyote, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Wildlife habitat is further improved by providing watering facilities.

The potential is fair for the production of merchantable timber. The complex is limited for this use by droughtiness, which influences the survival of seedlings. It is capable of producing good stands of merchantable timber, but the very steep slopes and the boulders on the surface make harvesting difficult. Capability subclass VIIe, nonirrigated.

67—Toiyabe-Corbett complex, 30 to 50 percent slopes. This steep complex is on mountainsides. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 35 inches, much of which occurs as snow. The average annual air temperature is 42 to 45 degrees F, and the frost-free season is 50 to 75 days.

This complex is about 55 percent Toiyabe stony loamy coarse sand and about 25 percent Corbett gravelly sand. The Toiyabe soil is on the south- and east-facing side slopes and on ridges. The Corbett soil is on the north- and east-facing side slopes.

Included with this complex in mapping is a soil that is similar to this Corbett soil but is deep. Also included are some areas of Rock outcrop. Included areas make up about 20 percent of the total acreage.

The Toiyabe soil is shallow and excessively drained. It formed in material weathered from granitic rock. Typically, the surface layer is gray stony loamy coarse sand about 7 inches thick. The next layer is gray gravelly loamy coarse sand about 13 inches thick. Weathered granitic bedrock is at a depth of 20 inches.

Permeability of the Toiyabe soil is rapid. Effective rooting depth is about 20 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is high.

The Corbett soil is moderately deep and somewhat excessively drained. It formed in material weathered from granitic rock. Typically, the surface layer is dark grayish brown and grayish brown gravelly sand and gravelly loamy coarse sand about 8 inches thick. The next layer is light brownish gray and light gray gravelly loamy coarse sand about 32 inches thick. Weathered granitic bedrock is at a depth of 40 inches.

Permeability of the Corbett soil is rapid. Effective rooting depth is about 40 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is high.

This complex is used for woodland wildlife habitat, woodland, and watershed.

The native vegetation on this complex is Jeffrey pine and an understory of antelope bitterbrush, big sagebrush, pointleaf manzanita, snowberry, and Thurber needlegrass. Where the tree canopy is closed, the amount of understory vegetation is greatly reduced.

The potential is poor for woodland wildlife habitat. The complex provides limited food and cover for mule deer, mountain lion, coyote, and grouse. Suitable management

practices are those that help to maintain or improve the habitat for these wildlife species. Wildlife habitat is further improved by providing watering facilities.

The potential is fair for the production of merchantable timber. The Toiyabe soil is capable of producing 5,980 cubic feet, or 21,950 board feet (Scribner rule), of merchantable Jeffrey pine timber per acre from a fully stocked, even-aged stand of trees 100 years old. The soil is limited for this use by the steep slopes, depth to bedrock, stones on the surface, and droughtiness, which influences the survival of seedlings. The Corbett soil is capable of producing 4,750 cubic feet, or 13,100 board feet (Scribner rule), of merchantable Jeffrey pine timber per acre from a fully stocked, even-aged stand of trees 100 years old. It is limited for this use by the steep slopes and droughtiness. Capability subclass VIIs, nonirrigated.

68—Toiyabe-Rock outcrop complex, 30 to 50 percent slopes. This steep complex is on mountainsides. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 35 inches. The average annual air temperature is 42 to 45 degrees F, and the frost-free season is 50 to 75 days.

This complex is about 60 percent Toiyabe stony loamy coarse sand and about 25 percent Rock outcrop. The Toiyabe soil is on south- and east-facing side slopes. Rock outcrop is on ridges and on some side slopes.

Included with this complex in mapping are some areas of Corbett soils and of a deep sandy soil. Included soils make up about 15 percent of the total acreage.

The Toiyabe soil is shallow and excessively drained. It formed in residuum from granitic rock. Typically, the Toiyabe soil has a surface layer of gray stony loamy coarse sand about 4 inches thick. The next layer is gray loamy coarse sand, gravelly coarse sand, and sand about 7 inches thick. Weathered granitic bedrock is at a depth of 11 inches.

Permeability of the Toiyabe soil is rapid. Effective rooting depth is about 11 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is high.

Rock outcrop commonly is barren exposures of rock. In some places a few inches of soil material covers the rock.

This complex is used for limited livestock grazing, woodland wildlife habitat, woodland, and watershed.

The native vegetation on this complex is Jeffrey pine, lodgepole pine, and an understory of antelope bitterbrush, big sagebrush, and Thurber needlegrass. Where the tree canopy is closed, the amount of understory vegetation is greatly reduced.

The potential is poor for livestock grazing. The complex is limited for this use by shallow depth, droughtiness, and steep slopes. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for woodland wildlife habitat. The densely wooded areas provide limited food. The more open areas provide food and cover for mule deer, mountain lion, coyote, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair for the production of Jeffrey pine. The main limitations for timber production are the steep slopes, depth to bedrock, and the high hazard of erosion. The Toiyabe soil is capable of producing 5,980 cubic feet, or 21,950 board feet (Scribner rule), of merchantable timber per acre from a fully stocked, even-aged stand of trees 100 years old. Capability subclass VIIe, nonirrigated.

69—Toiyabe-Rock outcrop complex, 50 to 75 percent slopes. This very steep complex is on mountainsides. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is 42 to 45 degrees F, and the frost-free season is 50 to 75 days.

This complex is about 55 percent Toiyabe stony loamy coarse sand and about 25 percent Rock outcrop. The Toiyabe soil is on the south- and west-facing side slopes. Rock outcrop is on ridges and on some side slopes.

Included with this complex in mapping are areas of Corbett soils and areas of a deep, very stony soil. Included soils make up about 20 percent of the total acreage.

The Toiyabe soil is shallow and excessively drained. It formed in residuum from granitic rock. Typically, the surface layer is gray stony loamy coarse sand about 9 inches thick. The next layer is gray loamy coarse sand, gravelly loamy coarse sand, and sand about 9 inches thick. Weathered granitic bedrock is at a depth of 18 inches.

Permeability of the Toiyabe soil is rapid. Effective rooting depth is about 18 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is high.

Rock outcrop is mainly barren exposures of rock. In some places a few inches of soil material covers the rock.

This complex is used for woodland wildlife habitat, woodland, and watershed.

The native vegetation on this complex is Jeffrey pine, lodgepole pine, and an understory of big sagebrush, antelope bitterbrush, pinemat manzanita, and Thurber needlegrass. Where the tree canopy is closed, the understory vegetation is greatly reduced.

This complex is poorly suited to livestock grazing, because it has very steep slopes.

The potential is poor for woodland wildlife habitat. The densely wooded areas provide very limited food. The more open areas provide food and cover for mule deer, mountain lion, coyote, and grouse. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Habitat is further improved by providing watering facilities for wildlife.

The potential is fair for the production of Jeffrey pine. The Toiyabe soil is capable of producing about 5,900 cubic

feet, or 21,000 board feet (Scribner rule), of merchantable timber per acre from a fully stocked, even-aged stand of trees 100 years old. The soil is limited for this use by the very steep slopes, high hazard of erosion, and depth to bedrock. Capability subclass VIIe, nonirrigated.

70—Toll gravelly loamy sand, 0 to 15 percent slopes. This deep, somewhat excessively drained, nearly level to strongly sloping soil is on undulating alluvial fans. It formed in alluvium mainly from granitic rock. Elevation ranges from 4,500 to 5,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is light brownish gray and brown gravelly loamy sand about 15 inches thick. Below this to a depth of 60 inches is pale brown loamy sand.

Included with this soil in mapping are some areas of soils in small drainageways that are subject to frequent flooding and some areas of soils that have a high water table as a result of overirrigation. Included areas make up less than 10 percent of the total acreage.

Permeability of this Toll soil is rapid. Effective rooting depth is about 60 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight. The hazard of soil blowing is high.

This soil is used for livestock grazing and rangeland wildlife habitat.

The native vegetation is big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. The soil is limited for this use by sandy texture, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

71—Urban land. Urban land consists of areas of soils that are so altered or obscured by urban works and structures that identification of the soils is not feasible. Not placed in a capability subclass.

72—Ursine Variant very gravelly fine sandy loam, 8 to 15 percent slopes. This shallow, well drained, strongly sloping soil is on undulating alluvial fans. It formed in alluvium from metasedimentary rock. Elevation ranges from 4,600 to 4,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is grayish brown and light brownish gray very gravelly fine sandy loam about 7 inches thick. Below this to a depth of 38 inches or more is a white hardpan.

Permeability of this Ursine Variant soil is moderately rapid to the hardpan. Effective rooting depth is about 7 inches. Available water capacity is very low. Surface runoff is medium, and the hazard of erosion is high.

This soil is used mainly for livestock grazing and rangeland wildlife habitat. A small acreage is used for homesites.

The native vegetation is big sagebrush, antelope bitterbrush, grasses, and some scattered pinyon and juniper.

The potential is poor for livestock grazing. The soil is limited for this use by shallow depth, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is very poor for rangeland wildlife habitat. This soil provides limited food and cover for mule deer, coyote, cottontail rabbit, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is poor for community development, sanitary facilities, and recreational development. Excavation for roads and housing is difficult because of the shallow depth to the hardpan and its thickness. Heavy equipment must be used for excavating and trenching. Septic tank absorption fields do not function properly unless they are placed below the hardpan. If density of housing is moderate or high, community sewage systems are needed. Capability subclass VIIs, nonirrigated.

73—Vamp fine sandy loam, drained. This moderately deep, somewhat poorly drained, nearly level soil is on slightly undulating alluvial fans. It formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is about 10 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is very pale brown and light gray fine sandy loam about 24 inches thick. The next layer is a light gray, strongly cemented hardpan about 6 inches thick. Below this to a depth of 60 inches is white, mottled, stratified loamy sand to loam.

Included with this soil in mapping are some areas of gently sloping Vamp soils on terrace breaks and small areas of soils that are high in content of gypsum. Included soils make up less than 10 percent of the total acreage.

Permeability of this Vamp soil is moderately rapid above the hardpan and very slow in the hardpan. Effective rooting depth is about 24 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight. The water table is at a depth of 5 to 6 feet. This soil is rarely flooded.

This soil is used for urban development. The urbanization on this soil and adjacent soils has caused the wildlife to seek food and cover in other areas.

The native vegetation is big sagebrush, Douglas rabbitbrush, and squirreltail.

The potential is poor for most community developments and sanitary facilities. Excavation for roads and housing exposes large areas to erosion. The pan is rippable, and excavating and trenching can be done with most equipment. Drainage can be provided by installing deep drains or channels with outlets. Protection from flooding can be provided by use of channels and small dikes. Septic tank absorption fields do not function properly and are a hazard to health because of seepage and the resulting contamination of the underground water. If density of housing is moderate or high, community sewage systems are needed. Areas used for recreation can be protected from dustiness and soil blowing by planting grass and shrubs. Capability subclass VIs, nonirrigated.

74—Vamp fine sandy loam, slightly saline-alkali. This moderately deep, somewhat poorly drained, nearly level soil is on slightly undulating flood plains. It formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is about 9 inches. The average annual air temperature is 49 to 51 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is very pale brown and light gray sandy loam about 24 inches thick. The next layer is a light gray, strongly cemented hardpan about 6 inches thick. Below this to a depth of 60 inches is white, mottled, stratified loamy sand to loam.

Included with this soil in mapping are some areas of gently sloping Vamp soils on terrace breaks and an area of soils that have a water table at a depth of less than 30 inches. Included soils make up less than 10 percent of the total acreage.

Permeability of this Vamp soil is moderately rapid above the hardpan and very slow in the hardpan. Effective rooting depth is about 24 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight. The water table is at a depth of 3 to 5 feet. The surface layer is slightly saline-alkali affected. This soil is rarely flooded.

This soil is used for urban development. Urbanization has caused wildlife to seek food and cover in other areas.

The native vegetation is big sagebrush, black greasewood, saltgrass, and alkali sacaton.

The potential is poor for most community developments and sanitary facilities. Excavation for roads and housing exposes large areas to erosion. Excavation and trenching can be done with most equipment because the pan is rippable. Drainage to protect dwellings, especially those with basements, should be provided by installing deep drains and channels with outlets. Dikes and channels protect dwellings from flooding. Septic tank absorption fields do not function properly and are a hazard to health because of seepage and the resulting contamination of ground water. If density of housing is moderate or high, community sewage systems are needed. Areas used for recreation can be protected from dustiness and soil blowing by planting grass and shrubs. Capability subclass VIw, nonirrigated.

75—Vicee-Aldax Variant complex, 30 to 50 percent slopes. This steep complex consists of deep and shallow, well drained soils on mountainsides. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is 20 to 30 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free season is 60 to 75 days.

This complex is about 70 percent Vicee very fine sandy loam and about 20 percent Aldax Variant very stony very fine sandy loam. The Vicee soil is mostly on north- and east-facing side slopes. The Aldax Variant soil is mostly on south-facing side slopes.

Included with this complex in mapping are some areas of soils that are similar to this Vicee soil but are only moderately deep. Also included on benches are some small areas of soils that are strongly sloping and have a clay loam subsoil. Included soils make up about 10 percent of the total acreage.

The Vicee soil is deep and well drained. It formed in colluvium from weathered metavolcanic rock. Typically, the surface layer is dark grayish brown and grayish brown very fine sandy loam about 7 inches thick. The next layer is light brownish gray very fine sandy loam about 39 inches thick. Weathered metavolcanic rock is at a depth of 46 inches.

Permeability of the Vicee soil is moderate. Effective rooting depth is about 46 inches. Available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is high.

The Aldax Variant soil is shallow and well drained. It formed in residuum from weathered metavolcanic rock. Typically, the surface layer is gray and grayish brown very stony very fine sandy loam about 5 inches thick. The next layer is light brownish gray very gravelly very fine sandy loam about 10 inches thick. Weathered metavolcanic rock is at a depth of 15 inches.

Permeability of the Aldax Variant soil is moderate. Effective rooting depth is about 15 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is moderate.

This complex is used for limited livestock grazing, woodland and rangeland wildlife habitat, woodland, and watershed.

The native vegetation on this complex is Jeffrey pine and an understory of big sagebrush, antelope bitterbrush, and grasses.

The potential is poor for livestock grazing. Suitable management practices are those that help to maintain or improve the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is fair to very poor for woodland wildlife habitat. The complex provides limited food and cover for

mule deer, mountain lion, coyote, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Effective management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife.

The potential is fair for the production of timber. The Vicee soil is capable of producing 6,750 cubic feet, or 27,200 board feet (Scribner rule), of merchantable timber per acre from a fully stocked, even-aged stand of Jeffrey pine 100 years old. It is limited for this use mainly by the steep slopes and high hazard of erosion. The Aldax Variant soil is capable of producing 5,200 cubic feet, or 16,400 board feet (Scribner rule), of merchantable timber per acre from a fully stocked, even-aged stand of Jeffrey pine 100 years old. It is limited for this use mainly by the steep slope, a stony surface layer, and a high hazard of erosion. Capability subclass VIIe, nonirrigated.

76—Vicee-Aldax Variant complex, 50 to 75 percent slopes. This very steep complex consists of deep and shallow, well drained soils on mountainsides. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 25 to 35 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free season is 65 to 75 days.

This complex is about 70 percent Vicee stony very fine sandy loam and about 20 percent Aldax Variant very stony very fine sandy loam. The Vicee soil is on north- and east-facing side slopes. The Aldax Variant soil is mainly on the south-facing side slopes.

Included with this complex in mapping are some areas of Rock outcrop and some areas of soils that are similar to this Vicee soil but are moderately deep. Also included are depressional areas of soils that have a thick surface layer. Included areas make up about 10 percent of the total acreage.

The Vicee soil is deep and well drained. It formed in colluvium from weathered metavolcanic rock. Typically, the surface layer is dark grayish brown stony very fine sandy loam about 7 inches thick. The next layer is light brownish gray very fine sandy loam about 39 inches thick. Weathered metavolcanic bedrock is at a depth of 46 inches.

Permeability of the Vicee soil is moderate. Effective rooting depth is about 46 inches. Available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is high.

The Aldax Variant soil is shallow and well drained. It formed in residuum from metavolcanic rock. Typically, the surface layer is gray and grayish brown very stony very fine sandy loam about 5 inches thick. The next layer is light brownish gray very gravelly very fine sandy loam about 10 inches thick. Weathered metavolcanic bedrock is at a depth of 15 inches.

Permeability of the Aldax Variant soil is moderate. Effective rooting depth is about 15 inches. Available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high.

This complex is used for very limited woodland and rangeland wildlife habitat, woodland, and watershed.

The native vegetation on this complex is Jeffrey pine and an understory of big sagebrush, antelope bitterbrush, and grasses.

The potential is fair to very poor for woodland wildlife habitat. This complex provides limited food and cover for mule deer, mountain lion, coyote, grouse, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Habitat is further improved by providing wildlife watering facilities.

The potential is poor for the production of timber. The production of merchantable timber on these soils is low. The tree stands are open and stunted. The soils are limited for timber production by the very steep slopes, stony surface layer, and the high hazard of erosion. Capability subclass VIIe, nonirrigated.

77—Voltaire silty clay loam, saline. This deep, poorly drained, saline-alkali affected soil is on flood plains. It formed in mixed alluvium mainly from granitic and basaltic rock. Slope ranges from 0 to 2 percent. Elevation is about 4,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 50 degrees F, and the frost-free season is 100 to 110 days.

Typically, the surface layer is gray, mottled silty clay loam about 18 inches thick. The next layer to a depth of 60 inches is gray, mottled, stratified silty clay loam to loamy sand.

Permeability of this Voltaire soil is slow. Effective rooting depth is about 60 inches. Available water capacity is high. Surface runoff is very slow, and the hazard of erosion is slight. This soil has a water table at a depth of 0 to 18 inches. The surface layer is slightly saline-alkali affected. This soil is rarely flooded.

This soil is used almost entirely for irrigated pasture. Some small areas have been leveled and are used for meadow grass hay.

The native vegetation is mainly wet meadow grasses that are salt and alkali tolerant.

This soil is capable of producing about 3 tons of legume hay per acre or about 8 animal units of forage per month per acre. Suitable management practices are those that improve the quality and quantity of usable forage. Management of irrigation water and use of proper irrigation systems are needed to avoid raising the water table. Pasture and hayland management and a planned grazing system are needed.

The potential is fair for wetland wildlife habitat. This soil provides food and cover for duck, geese, and shore birds. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Plantings of Japanese millet or proso millet increase the supply of food suitable for waterfowl. Capability subclass VIw, nonirrigated.

78—Xerta-Rock outcrop complex, 4 to 30 percent slopes. This moderately sloping to moderately steep complex is on hilly uplands. Elevation ranges from 5,000 to

6,800 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 51 degrees F, and the frost-free season is 100 to 110 days.

This complex is about 65 percent Xerta extremely stony loam and about 20 percent Rock outcrop. The Xerta soil is mainly on east- and southeast-facing side slopes, but in the more nearly level areas it is on all aspects. Rock outcrop occurs as ridges and escarpments scattered throughout areas of the Xerta soil.

Included with this complex in mapping are some areas of Nosrac soils, some areas of Rubble land, and areas of a soil that is similar to this Xerta soil but has a sand surface layer about 20 inches thick. Included areas make up about 15 percent of the total acreage.

The Xerta soil is moderately deep and well drained. It formed in material weathered from basaltic rock. Typically, the surface layer is grayish brown and brown extremely stony loam about 10 inches thick. The next layer is clay about 13 inches thick. A white indurated hardpan, about 1 inch thick over unweathered basalt, is at a depth of 23 inches.

Permeability of this Xerta soil is slow. Effective rooting depth is about 23 inches. Available water capacity is very low. Surface runoff is slow, and the hazard of erosion is slight.

Rock outcrop commonly consists of barren exposures of basaltic rock.

This complex is used mainly for livestock grazing and rangeland wildlife habitat.

The native vegetation on this complex is big sagebrush, low sagebrush, and grasses.

The potential is poor for livestock grazing. The Xerta soil is limited for this use by the moderate depth to the hardpan, low available water capacity, and droughtiness. Suitable management practices are those that help to maintain the plant cover and control erosion. Deferred grazing and other grazing management practices help to maintain and improve the production of forage.

The potential is poor for rangeland wildlife habitat. This complex provides limited food and cover for mule deer, coyote, chukar, and quail. Suitable management practices are those that help to maintain or improve the habitat for these wildlife species. Management of livestock grazing improves the plant cover and increases the production of forage suitable for wildlife. Capability subclass VIIs, nonirrigated.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful for (1) planning use and management of the soils for cropland, pasture, rangeland, and woodland; (2) planning sites for buildings and sites for highways and other transportation systems; (3) planning the location and management of sanitary facilities; (4) planning the location and use and management of parks and other recreation facilities; and (5) planning the use and management of soils for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures because of unfavorable soil properties can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed, and the system of land capability classification used by the Soil Conservation Service is explained.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of manage-

ment systems for individual fields or farms should also consider the detailed information given in the description of each soil.

The aim of good land use is to produce the greatest amount of the most needed crops and, at the same time, protect and improve the soil. To achieve this aim, the land must be protected according to its needs and used within its capabilities. This can be done by using plants that are well suited to the soil, applying soil management practices that protect the soil, and keeping the soil in good tilth.

In the following paragraphs the principal soil management practices needed in the survey area are generally described. Although the soils in the survey area differ in management needs, certain practices apply to all of the soils that are cultivated.

Conservation cropping systems.—A conservation cropping system is the growing of crops in combination with needed cultural and management practices. If soil-improving crops and practices more than offset the soil-depleting crops and deteriorating practices, then it is a good conservation cropping system.

Soil-improving practices in a conservation cropping system include the growing of grasses and legumes, the return of crop residue to the soil, proper tillage, adequate fertilization, weed- and pest-control measures, and other good management practices.

Several cropping systems are used in the survey area. A typical one is alfalfa grown for about 6 to 8 years, small grain or field corn for 2 years, and then back to alfalfa with a protective nurse crop of oats. The crop residue of the small grain or field corn is returned to the soil, and tillage is reduced to only those operations that are necessary.

Crop residue management.—Crop residue management is the use of plant residue left in cultivated fields. It is done by incorporating the residue into the soil or by leaving it on the surface during that part of the year when erosion is likely. Plant residue adds organic matter. A major benefit of organic matter in the soil is its influence on the development and stabilization of good tilth and its relationship to the general physical environment of the soil, which influences crop growth. Organic matter functions mainly as it decomposes. The application of nitrogen fertilizer to the soil aids in this process.

It is particularly important that organic matter be continuously returned to the soil. The easiest and most common way to add organic matter to the soil is to return plant residue produced by a crop. Unless sufficient crop residue is returned to the soil, the tilth of the soil declines, soil compaction starts, and slower water infiltration and poorer aeration result.

Erosion control.—Erosion control prevents the excessive wearing away of the land surface by wind, running water, and other geological agents. Protection of the surface layer is important because the surface layer contains most of the organic matter and generally is more fertile than the subsoil. Erosion can be controlled by using cover crops to protect the surface during windy or stormy periods; by leveling in spring and then seeding right away; and by leveling to the proper grade and applying water at the proper rate.

Addition of plant nutrients.—Most of the irrigated soils used for crops in this survey area respond well to liquid or solid fertilizer. The specific fertilizer needed depends on the kind of crop grown and the nutrient level in the soil. Applying a combination fertilizer that contains nitrogen and phosphate increases production of small grain and aids in establishing alfalfa. Thereafter, alfalfa benefits from phosphate applied every 2 years for the life of the stand, except where the soil contains enough available phosphorus.

Barnyard manure adds some nitrogen, phosphate, and potassium to the soil and promotes good tilth. If barnyard manure is available, it can be used with good results before planting corn or small grain.

Irrigation water management.—Irrigation water management requires the regulation of applications of irrigation water at rates and amounts that will insure high crop production and minimum soil and water losses. It is needed in all irrigated areas. Good irrigation means applying water according to the crop needs and at rates and in amounts consistent with the characteristics of the soil.

Efficient delivery of water to farms is the first step in supplying the moisture needed by growing crops. A good distribution system is one that has enough capacity to meet the needs of the crops irrigated, that is so located and controlled that seepage losses are negligible, and that carries the required flow safely.

Next, the water must be delivered from the distribution system to the individual fields. An efficient system for transporting water on a farm or ranch is so designed and constructed that it carries the required flow without excessive seepage and without causing erosion. Control structures are needed to facilitate the handling of water.

The design of an irrigation system is governed by the method of irrigation to be used, the amount of land leveling needed, and the expected efficiency in applying water. In this survey area two methods of irrigation are commonly used: border and furrow. Border irrigation, the most commonly used method, consists of applying water to strips of varying width that are separated by low dikes or border ridges. It is suitable on fields of close-growing crops. It can be used on all soils except those that have a high intake rate and poor lateral movement of water.

If the water is to be applied efficiently, a farmer needs to know the capacity of the soil to hold water that plants can use, the rate that water enters and moves through the soil, and the amount of water required by the crop. Most crops should be irrigated when 40 to 50 percent of the available moisture has been depleted from the top half of the root zone of the plant. Forty-eight hours after irrigation, a soil check can be made to determine if the desired moisture has been added.

Drainage.—Drainage is a major concern in the Carson City Area. In some areas where the water table has been lowered, improved meadow hay and pasture are produced.

A fluctuating water table is present in the soils on the low flood plains. One major factor contributing to the high water table is the seepage of water from the Carson River and other contributing streams. Also, the water table rises if irrigation water is applied.

In soils that are inadequately drained, soluble salts and alkali accumulate and retard or prevent the growth of crops. Also, soils that are inadequately drained have poor soil aeration, which reduces the growth of plants and increases the susceptibility of plants to diseases.

Even soils that are moderately well drained to well drained must have drainage established if they are to be reclaimed. The reclamation processes require large amounts of water to leach the salts from the root zone and drains to dispose of surface and subsurface water.

Managing saline-alkali soils.—Like most soils in arid and subarid regions, the soils on alluvial fans and flood plains contain at least small quantities of soluble salts and alkali (*8*). Because rainfall is low and evaporation is high, percolating rainfall is insufficient to leach salts out of the root zone. In some soils the salts and alkali are highly concentrated and limit or prevent the growth of crops. In addition, many low-lying areas receive salty water from runoff or seepage. Surface evaporation of such water generally results in a further increase of soluble salts on or in the soils. In some areas that have a high water table, water may rise in the soil by capillary action and carry dissolved salts with it. Soluble salts are readily dissolved in water and can move to any part of the soil profile.

A soil that contains excessive amounts of soluble salts but not alkali is called a saline soil. One that contains excessive absorbed sodium is called an alkali soil. A soil that contains both excess soluble salts and alkali is described as saline-alkali (*7*).

Saline-alkali phases of several of the soils in the survey area have been mapped. The mapping unit name does not give the degree to which these soils are affected, nor does it indicate if the soils contain both salt and alkali, but this information is given in the mapping unit description. Three saline and alkali classes are used in soil phases:

1. Soils that are free of excess salts and alkali and are less than 0.15 percent salts. The conductivity of the saturation extract is less than 4 millimhos per centimeter at 25 degrees C in soils of this class, and the total content of exchangeable sodium is less than 15 percent.

2. Slightly saline-alkali soils, which are 0.15 to 0.35 percent salts. The conductivity of the saturation extract is 4 to 8 millimhos per centimeter at 25 degrees C. Moderately coarse, medium, moderately fine, and fine textured soils in this class are 15 to 20 percent exchangeable sodium.

3. Strongly saline-alkali soils, which are more than 0.65 percent salts. The conductivity of the saturation extract is greater than 15 millimhos per centimeter at 25 degrees C. Moderately coarse, medium, moderately fine, and fine textured soils in this class are more than 25 percent exchangeable sodium.

Although a distinct gap occurs between the second class and the third, an intermediate, or moderate, class is not needed in this area because only a very small percentage of the samples analyzed in this survey area was moderately saline-alkali.

Some soils mapped as slightly saline-alkali are free of excess salts and alkali in the upper 4 or 5 inches but contain slight or moderate concentrations just below the plow layer. Several soils mapped as strongly saline-alkali are only slightly affected in the plow layer.

Soils differ in the kinds of salt they contain and in the practices needed for their improvement. For this reason, each soil requires individual treatment; however, some helpful general guidelines are given in the following paragraphs.

A good supply of irrigation water and adequate drainage must be provided to reclaim any soil in this area. Two methods of applying water are commonly used. One method is to level the areas to flat basins and then pond the water within these basins. The other method requires that the areas be leveled to a uniform grade and then flooded between the border dikes. If drainage is adequate and large amounts of water are used, either method is effective in leaching the soluble salts out of the root zone. If the soils contain an excessive amount of absorbed sodium, the process is more difficult. In addition to drainage and leaching, other practices are needed for the improvement of alkali soils.

Chemical amendments used to replace sodium are gypsum and its various forms, including gypsite, anhydrite, and selenite, as well as elemental sulfur, sulfuric acid, iron sulfate, and aluminum sulfate. Any of these amendments can be successfully used, though the action is faster with some than with others. Cost and availability generally determine the choice. The amount of amendment needed for improving a soil is determined by laboratory analyses of soil samples. These analyses indicate the amount of sodium that must be replaced if the soil is to be improved.

Because the amount of soluble salts and alkali may differ within short distances, the sampling shows only the average concentrations in a field. If some alkali spots remain after the first treatment, they can be corrected the following year. An estimate of the amount of amendments needed should not be based on an analysis of the most strongly alkali spots, because the estimate could be two to five times greater than the amount actually needed.

If an amendment other than gypsum or sulfur is used, the relative amount needed can be determined from the following list. The first column gives the amendment that can be used, and the second column gives the number of tons of amendment equivalent to 1 ton of sulfur.

Sulfur	1.00
Sulfuric acid	3.06
Gypsum	5.38
Iron sulfate	8.69
Aluminum sulfate	6.94

Iron sulfate and aluminum sulfate act quickly, but high cost prohibits their general use.

For efficiency in replacing sodium, most of the soluble salts should be leached before applying chemical amendments. If the soluble salts are removed, more calcium is available for replacing absorbed sodium. For soil improvement, however, the efficient removal of sodium by leaching before amendments are applied may be more than offset by the decrease in soil permeability that generally accompanies the leaching of salts from saline-alkali soils. The resulting permeability, therefore, determines whether amendments should be applied before or after soluble salts are removed. In this survey area, it is advisable to remove part of the salts through leaching and then apply the amendment.

Chemical amendments normally are broadcast and incorporated into the soil by light disking. Sulfur should be thoroughly mixed with the soil to insure rapid oxidation to the sulfate form. Some amendments can be added to the irrigation water. Gypsum dissolves so slowly, however, that the amount that can be applied in irrigation water is less than the amount needed by the soil.

Except where sulfur is used, saline-alkali soils should be leached immediately after the amendment is applied. Leaching dissolves the amendment and carries it downward, and it also removes the soluble salts that form as the absorbed sodium is replaced by calcium.

Where sulfur is applied, sufficient time should be allowed before leaching so that the sulfur is oxidized and reacts with the lime to form gypsum. The soil must be kept moist, however, because water is needed for the oxidation of sulfur. Consequently, the most favorable season for applying sulfur is fall rather than spring.

An alternative to reclamation through use of large quantities of gypsum is the seeding of salt- and alkali-tolerant grasses. Among the grasses well suited are tall wheatgrass, western wheatgrass, and alta fescue. These grasses can grow in relatively strong concentrations of both soluble salts and alkali.

In using grass to improve an area, the greatest difficulty is getting a satisfactory stand. High concentrations of salts delay germination and limit the absorption of water. In addition, seeds may not germinate after the first irrigation, or even after the second or third. Seeds that fail to germinate eventually rot.

The second stage in establishing grass is the growth of seedlings upward through the soil. If a saline-alkali soil dries out, it tends to bake and to crust. When the surface is severely crusted, seedlings cannot break through and they die.

Frequent light irrigations can be used to reduce the salt accumulation around the seeds and to prevent crusting. The soil may need to be irrigated every 3 to 5 days until the crop has grown to a height of 3 to 5 inches. Applying a small amount of gypsum or sulfur, generally 2 to 4 tons per acre, helps to prevent crusting and allows seedlings to emerge.

Proper pasture management.—Proper pasture management is grazing pasture at a rate that will maintain grasses and legumes of high quality. This objective can be accomplished by adjusting the stocking rates or season of use to favor maximum growth and survival.

A common method of pasture management is to use several pastures and a rotation system that allows adequate regrowth in each. Care should be taken to keep the livestock off the pasture when it is wet. If livestock is allowed to graze when the pasture is wet, the soil compacts, the intake rate decreases, and the structure is destroyed. The pasture should have proper irrigation water management, and drainage should be provided. Increased yields can be obtained by applying commercial fertilizer and barnyard manure. Weeds generally can be controlled by mowing. Droppings of manure can be spread with a drag each spring.

Hayland management.—Hayland management is the proper treatment and use of hayland to prolong the life of desirable forage species, to maintain or improve the quality and quantity of the forage, and to protect the soil and reduce the water loss. This includes the establishment and renovation of alfalfa hayfields and meadow fields with long-term stands of adapted species.

Crop yields can be effectively increased by using adapted species. When hayland is renovated or established, plants should be selected that withstand climatic extremes and still produce high yields during the relatively short growing season. The seed should be of high quality and certified. Inoculated seed should be used in planting. Land leveling, grading, shaping, and subsoiling operations should be completed prior to seedbed preparation. Growing an annual crop for a year prior to reestablishing a forage crop allows for final smoothing and erosion control. Seed can be drilled directly into stubble of the preceding annual crop. Irrigation prior to planting may be necessary to prepare a seedbed.

Companion crops may be essential if soil blowing is a hazard. Disease can be controlled by the use of resistant species, crop rotation, and proper irrigation management.

Fertilization is essential to ensure that growth factors are not limiting. The fertilization rate depends on the soil and on the crop grown.

The management of established stands should regulate the frequency and amount of irrigation water applied. The frequency and amount of irrigation water applied depends on the available water capacity of the soil and the rate of removal of water from the soil by evapotranspiration. Subirrigation requires special irrigation water management to control the level of the water table and prevent the accumulation of excessive soluble salts.

Native meadows used as hayland have low forage production because there is an excess of uncontrolled runoff water in spring and generally a shortage of water in summer. Improvements should include water management, fertilization, and control of excessive salts and alkali.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In Carson City Area, all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Range

By John L. McLain, range conservationist, Soil Conservation Service.

About 61 percent of the soil survey area is range. Most farm income is derived from cattle and sheep production. The major range area is in the Pine Nut Range, along the eastern half of the survey area. There is some grazing in the foothills of the Carson Range. These areas are mostly public lands, where grazing is regulated by the Bureau of Land Management. Limited grazing on the Toiyabe National Forest lands is regulated by the Forest Service. Livestock grazing on rangeland in the survey area is mainly restricted to the period from May to October. Livestock is wintered on the valley farms and fed hay and some supplements. Urbanization is gradually encroaching on some rangeland areas surrounding Carson City.

The native vegetation in many parts of the survey area has been greatly depleted over the years by early trail herds that used the range excessively, by fires, by mining explorations, and by some injudicious use of off-road vehicles. Sagebrush, rabbitbrush, and other less desirable vegetation grow in areas that once produced abundant mixed stands of desirable perennial grasses and shrubs. Cheatgrass and other annuals, which have invaded an extensive part of the survey area, make use of early available moisture. As desirable plant species are grazed out, more bare soil becomes vulnerable to soil blowing and erosion. Range condition can be improved by using management practices that are effective for specific kinds of soil and specific range sites.

A major concern on most of the rangeland is to control grazing so that the kinds and amounts of plants that make up the potential plant community are maintained or reestablished. Singleleaf pinyon and Utah juniper are replacing forage species that are necessary for both livestock and wildlife. Chaining the singleleaf pinyon and Utah juniper in carefully selected areas followed by seeding, along with selective harvesting for Christmas trees and firewood, improves the understory vegetation available for wildlife and livestock. Wild horses are also a management concern in the Pine Nut Range because of their open-range status and year-round use of range. The wild horses compete for forage with livestock and big game in this range area. If sound range management based on soil survey information and rangeland inventories is applied, the potential is good for increasing the productivity of range in the area.

On the eastern side of the survey area is an extensive area of soils that are shallow to moderately deep and have a stony, medium textured surface layer and a fine

textured to moderately fine textured subsoil. Singleleaf pinyon and Utah juniper are the main plants on this site. The northeastern side of the survey area supports stands of intermingled big sagebrush, singleleaf pinyon, and Utah juniper on soils that are shallow to moderately deep and have a moderately coarse textured surface layer and numerous Rock outcrops. In small scattered areas on the eastern side of the survey area are soils that have a very stony, moderately fine textured surface layer and a fine textured subsoil. A claypan near the surface restricts plant growth on these soils to low sagebrush and some grasses. Deep, coarse textured soils that have rapid permeability occur in small areas throughout the survey area. These soils have a plant cover of antelope bitterbrush, big sagebrush, and some grasses. An area of big sagebrush and grass is in the northern part of the survey area on soils that are shallow and coarse textured. This vegetation is also present in the southwestern and southeastern parts of the survey area in a complex of shallow and deep soils that have a moderately coarse textured surface layer and moderately coarse textured to moderately fine textured subsoil. On mountainsides in the western part of the survey area are steep soils that are shallow to deep and rapidly permeable to moderately rapidly permeable. Conifer woodland occurs throughout this area, except in some burned areas of limited acreage, where manzanita, snowbrush, and big sagebrush are the dominant plants.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 5 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 5.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Potential production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic species of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Woodland management and productivity

By John McLain, range conservationist, Soil Conservation Service.

Woodland in the soil survey area is divided by the valley floor. Conifers are in the Carson Range in the western part of the survey area, and singleleaf pinyon and Utah juniper are in the Pine Nut Range in the eastern part. With early mining activity in the Virginia City area, much of the east slope of the Carson Range was lumbered and cleared of stumps. The timber was used for structural support in the mine shafts, for building, and for firewood. Forest fires also contributed to much of the timber losses. This area is now protected from commercial lumbering because the density of the stands of timber in accessible areas is low and the hazard of erosion is high.

The main value of the conifer forest is watershed protection, wildlife habitat, limited livestock grazing, and esthetic purposes. Any attempt at commercial lumbering should be carefully considered from the standpoint of soil stability. The trees at intermediate elevations are Jeffrey pine and white fir. Among the trees at the higher elevations are red fir, whitebark pine, and Jeffrey pine. Also, sparse stands of mountain hemlock and lodgepole pine are in some areas. Incense cedar occurs at various elevations, but it is not a significant part of the stands.

The pinyon-juniper woodland in the Pine Nut Range occupies about 30 percent of the eastern side of the survey area and is intermingled with rangeland along the fringes. In past years thousands of acres were burned off by wildfire, but in recent years the extent of the stand has been increasing because of modern fire control techniques and other factors. Attempts to control the proliferation of these trees by chaining in selected areas have been carried out with some degree of success. After being chained, these areas are revegetated with adapted plant species that are palatable to both big game and livestock.

Established uses for the singleleaf pinyon and Utah juniper woodland include collection of pinyon nuts in fall, cutting of Christmas trees, cutting for firewood, and limited use of juniper for fenceposts. Recent research indicates that these trees have potential for use in the production of high grade fiberboard.

About 13 percent of the survey area is grazable woodland in the Pine Nut Range. Grazable woodland is forest land on which the understory includes, as an integral part of the potential plant community, plants that can be grazed without significantly impairing other forest values. It is distinguished from other woodland by a more open canopy, which permits the growth of an understory of mixed shrubs and grasses. On such forest land, grazing is compatible with tree management if it is controlled in such a manner that the value of the forest land for both wood products and forage is not impaired. Understory production varies considerably according to the density of the singleleaf pinyon and Utah juniper canopy, exposure, slope, and kind of soil.

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codomi-

nant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management (*10*). Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service, using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use and that any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or so difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and

the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is solid waste (refuse) and soil material that is placed in successive layers either in excavated

trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding

during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

By Norman R. Ritter, resource conservationist, Soil Conservation Service

Mule deer are the most common big game animals in the survey area. The high mountain ranges and the lower valley and foothill areas provide year-round habitat for these animals. Late in fall the deer migrate from the high mountain pastures to the relatively snow-free lower slopes and alluvial fans, where they remain through the winter. Black bear and mountain lion are occasional visitors. Wild turkeys have been released, and they appear to be establishing themselves in the parts of the area that provide suitable habitat.

Valley quail, chukar, and mourning dove are common in the valley and upland areas. There are small populations of upland game birds, such as blue grouse, sage grouse, and mountain quail. Ring-necked pheasant have been introduced, and a small number of them inhabit the cultivated areas in the valley. Small game animals such as cottontail rabbit are common throughout the area. Some furbearers, such as mink, muskrat, and otter, inhabit the marsh areas.

Several of the perennial streams, such as Clear, Kings Canyon, and Ash Creeks and the branches of the Carson River, have harvestable populations of trout, which are maintained by a fish stocking program.

Waterfowl use the wet areas throughout the survey area for food and nesting in summer. In winter, they use areas of open water and snow-free cultivated areas.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either is scarce or does not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Exam-

ples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include quail, pheasant, meadowlark, field sparrow, and cottontail rabbit.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkeys, blue grouse, mountain quail, Steller's jay, mountain bluebird, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, blackbirds, muskrat, mink, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include desert mule deer, bobcat, coyote, sage grouse, meadowlark, and loggerhead shrike.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features and engineering test data.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 16. The estimated classification, without group index numbers, is given in table 13.

Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 14. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis

of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil by water from overflowing streams, by runoff water from adjacent

slopes, or by tidal water. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

The high water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to assure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 16.

The methods used to obtain data and their codes are AASHTO classification (M-145-66); Unified classification (D-2487-69); mechanical analysis (T88-57); liquid limit (T89-60); and plasticity index (T90-56).

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soils and the material in which they formed are discussed for each series. The soils are then compared with similar soils and with nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*9*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Aldax series

The Aldax series consists of shallow, well drained soils on uplands. These soils formed in residuum from andesitic and basaltic rock. Slope ranges from 15 to 50 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 45 to 49 degrees F.

Aldax soils are similar to Aldax Variant, Glenbrook, and Hocar soils and are near Indiano soils. Aldax Variant soils are colder. Glenbrook soils are shallow over granitic bedrock. Hocar soils are calcareous throughout. Indiano soils are moderately deep over bedrock and have a clay loam B2t horizon.

Typical pedon of an Aldax very stony fine sandy loam in an area of Aldax-Indiano association, 6 miles south and 1 mile east of Carson City, about 1,000 feet north and 1,000 feet east of northeast corner of sec. 10, T. 14 N., R. 20 E.:

A11—0 to 3 inches; grayish brown (10YR 5/2) very stony fine sandy loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine interstitial pores; 15 percent stones, 10 percent cobbles, and 25 percent gravel; neutral; clear wavy boundary.

A12—3 to 14 inches; brown (10YR 5/3) very stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine and very fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 25 percent stones, 20 percent cobbles, and 30 percent gravel; neutral; abrupt irregular boundary.

R—14 to 16 inches; extremely hard andesite.

Depth to andesite or basalt is 10 to 20 inches. The profile is 40 to 80 percent angular rock fragments. It is as much as 30 percent stones or cobbles and as much as 50 percent gravel. The profile ranges from medium acid to neutral. It has hue of 10YR or 7.5YR, value of 4 or 5 when dry, and chroma of 2 or 3. The average texture of the matrix is fine sandy loam or loam that is less than 20 percent clay. Horizons of some pedons are sandy loam. The profile has weak or moderate, very fine to medium, granular or subangular blocky structure.

Aldax Variant

The Aldax Variant consists of shallow, well drained soils on mountains. These soils formed in colluvium and residuum from metavolcanic rock. Slope ranges from 30 to 50 percent. The average annual precipitation is 20 to 35 inches, and the average annual air temperature is 41 to 45 degrees F.

Aldax Variant soils are similar to Aldax, Glenbrook, Toem, Toiyabe, and Vicee soils. They are near Arkson, Cagwin, Corbett, Glenbrook, Toem, and Toiyabe soils. Aldax soils are warmer and are underlain by hard andesite at a depth of 10 to 20 inches. Cagwin and Corbett soils are sandy, and they are moderately deep over granitic bedrock. Glenbrook, Toem, and Toiyabe soils are shallow over granitic bedrock and are sandy. Vicee and Arkson soils are deep and loamy.

Typical pedon of an Aldax Variant very stony very fine sandy loam, in an area of Aldax Variant-Rock outcrop complex, 30 to 50 percent slopes, 3 miles west of Carson City, about 100 feet west and 250 feet south of the northeast corner of sec. 22, T. 15 N., R. 19 E.:

O1—2 inches to 0; pine litter.

A11—0 to 1 inch; gray (10YR 6/1) very stony very fine sandy loam, very dark gray (10YR 3/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 25 percent gravel and 10 percent stones; neutral; abrupt smooth boundary.

A12—1 to 5 inches; grayish brown (10YR 5/2) very gravelly very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine tubular pores; 40 percent gravel and 5 percent cobbles; neutral; clear wavy boundary.

B2—5 to 15 inches; light brownish gray (10YR 6/2) very gravelly very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine pores and few medium pores; 40 percent gravel and 15 percent cobbles; slightly acid; clear irregular boundary.

Cr—15 to 29 inches; weathered metavolcanic rock.

The thickness of the solum and the depth to bedrock range from 10 to 20 inches. The solum is 35 to 50 percent gravel and 5 to 20 percent cobbles. The A horizon in the upper 1 to 3 inches has chroma of 1 or 2 when moist. The B horizon is very gravelly very fine sandy loam or gravelly loam. It has hue of 10YR or 2.5Y. It has weak or moderate, fine or medium, subangular blocky structure.

Arkson series

The Arkson series consists of deep, well drained soils on mountains. These soils formed in colluvium from metavolcanic rock. Slope ranges from 30 to 50 percent. The average annual precipitation is 30 to 40 inches, and the average annual air temperature is 40 to 45 degrees F.

Arkson soils are similar to Cagwin, Corbett, and Vicee soils. They are near Aldax Variant, Corbett, Toem, and Toiyabe soils. Cagwin and Corbett soils are sandy. Vicee soils have bedrock at a depth of 40 to 60 inches, do not have a stony surface layer, and are warmer. Aldax Variant, Toem, and Toiyabe soils are shallow over bedrock.

Typical pedon of an Arkson stony very fine sandy loam in an area of Arkson-Rock outcrop complex, 30 to 50 percent slopes, 3 miles west of Carson City, about 0.4 mile west and 0.5 mile south of the northeast corner of sec. 17, T. 19 N., R. 15 E.:

A11—0 to 3 inches; grayish brown (10YR 5/2) stony very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent stones, 30 percent gravel, and 10 percent cobbles; neutral; clear smooth boundary.

A12—3 to 15 inches; brown (10YR 5/3) gravelly very fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine tubular pores; 25 percent gravel; neutral; clear smooth boundary.

C1—15 to 40 inches; very pale brown (10YR 7/3) gravelly very fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine, fine, and medium tubular pores; 25 percent gravel; neutral; clear smooth boundary.

C2—40 to 60 inches; very pale brown (10YR 7/3) very gravelly very fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine, fine, and medium tubular pores; 50 percent gravel; neutral.

The A horizon has value of 4 or 5 when dry and 2 or 3 when moist and has chroma of 1 to 3. It is very fine sandy loam or loam. It is slightly acid or neutral. The A horizon has medium subangular blocky structure, has fine or medium platy structure, or is massive. The A11 horizon is 5 to 10 percent stones. The C horizon has value of 6 or 7 when dry and 4 or 5 when moist and has chroma of 1 to 3. It is loam or very fine sandy loam. The C horizon is generally about 15 to 55 percent gravel and 5 to 10 percent cobbles, but it is less than 35 percent coarse fragments at a depth of less than 36 inches.

Bishop series

The Bishop series consists of very deep, poorly drained soils on smooth flood plains. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 8 to 12 inches, and the average annual air temperature is 49 to 50 degrees F.

Bishop soils are similar to and are near Cradlebaugh, Jubilee, Kimmerling, Orizaba, and Voltaire soils and Histic Haplaquolls. Cradlebaugh soils have cemented nodules at a depth of about 22 inches. Jubilee soils have a sandy loam C horizon. Kimmerling soils are noncalcareous. Orizaba soils have a light colored surface layer. Voltaire soils have a more clayey surface layer. Histic Haplaquolls have a peat surface layer about 9 inches thick.

Typical pedon of Bishop loam, saline, 1 mile east of Carson City, about 2,330 feet east and 1,100 feet north of the southwest corner of sec. 16, T. 15 N., R. 20 E.:

A11—0 to 3 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; many very fine and fine tubular pores; violently effervescent; very strongly alkaline; clear smooth boundary.

A12—3 to 20 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium roots and many very fine and fine roots; common very fine and fine tubular pores; violently effervescent; strongly alkaline; clear smooth boundary.

A13—20 to 28 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; common fine dark brown (7.5YR 3/2) and very dark brown (10YR 2/2) mottles; hard, friable, sticky and plastic; few medium roots and common very fine and fine roots; many very fine and fine tubular pores and few medium tubular pores; strongly effervescent; many soft seams of very fine lime; strongly alkaline; clear smooth boundary.

C1—28 to 40 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (10YR 3/3) moist; many medium very dark grayish brown (10YR 3/2) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores and few medium tubular pores; violently effervescent; strongly alkaline; clear smooth boundary.

C2—40 to 48 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; common fine yellowish brown (10YR 5/4) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; violently effervescent; many soft seams of lime; strongly alkaline; clear smooth boundary.

C3—48 to 60 inches; pale olive (5Y 6/3) sandy clay loam, dark brown (10YR 4/3) moist; many fine and medium dark yellowish brown (10YR 4/4) and olive (5Y 4/4) mottles; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; moderately alkaline.

The soil commonly is calcareous throughout. It is strongly alkaline or very strongly alkaline, and reaction decreases with depth. Iron mottling is generally at a depth of more than 15 inches. The A horizon has value of 2 or 3 when moist and chroma of 2 or 3. The C horizon has hue of 10YR, 2.5Y, or 5Y; value of 6 or 7 when dry; and chroma of 1 to 3. It has iron mottling in hue of 7.5YR to 5Y, value of 3 to 7, and chroma of 1 to 6. Gleyed mottles are common. The C horizon is stratified sandy loam, loam, sandy clay loam, and clay loam.

Cagle series

The Cagle series consists of moderately deep, well drained soils on mountains. These soils formed in residuum and colluvium from andesitic rock. Slope ranges from 15 to 50 percent. The average annual precipitation is 12 to 16 inches, and the average annual air temperature is 47 to 50 degrees F.

Cagle soils are similar to Oppio and Xerta soils. They are near Deven, Koontz, Nosrac, Sutro, and Holbrook Variant soils. Oppio soils are moderately deep over unweathered bedrock. Xerta soils have a hardpan over bedrock, which is at a depth of 20 to 40 inches. Deven soils are shallow over bedrock. Sutro soils are loamy. Holbrook Variant soils are very gravelly. Koontz and Nosrac soils have a very gravelly clay loam B2t horizon.

Typical pedon of a Cagle very stony clay loam in an area of Cagle-Nosrac association, 10 miles southeast of Carson City, about 0.2 mile south and 0.2 mile west of the northeast corner of sec. 2, T. 14 N., R. 21 E.:

A1—0 to 2 inches; grayish brown (10YR 5/2) very stony clay loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; 5 percent stones; neutral; abrupt smooth boundary.

B21t—2 to 5 inches; dark gray (10YR 4/1) clay, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; very hard, friable, very sticky and plastic; common medium and fine roots; few very fine and fine pores; 10 percent gravel; neutral; clear smooth boundary.

B22t—5 to 17 inches; dark grayish brown (10YR 4/2) gravelly clay, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse angular blocky structure; very hard, friable, very sticky and plastic; few very fine and fine roots; few very fine pores; 25 percent gravel; neutral; clear smooth boundary.

B23t—17 to 30 inches; olive gray (5Y 5/2) very gravelly clay, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots; few very fine pores; 60 percent gravel, 5 percent cobbles, and 5 percent stones, mostly weathered andesite; common moderately thick dark yellowish brown (10YR 4/4) clay films on faces of peds and rock fragments; neutral; gradual irregular boundary.

Cr—30 to 60 inches; weathered andesitic bedrock.

The thickness of the solum and the depth to bedrock range from about 20 to 40 inches. The A horizon and the upper part of the B horizon have hue of 10YR or 7.5YR and chroma of 1 to 3. Gravel content ranges from 15 to 25 percent. The lower part of the B horizon and the C horizon have hue of 10YR, 2.5Y, or 5Y; value of 5 to 7 when dry and 2 to 4 when moist; and chroma of 2 to 5. The B horizon is clay or heavy clay loam. The upper part of the B horizon is 20 to 30 percent gravel. The lower part of the B horizon is 50 to 80 percent rock fragments. It is 20 to 70 percent gravel, 5 to 20 percent cobbles, and 0 to 10 percent stones.

Cagwin series

The Cagwin series consists of moderately deep, somewhat excessively drained soils on mountainsides. These soils formed in colluvium from granitic bedrock. Slope ranges from 15 to 75 percent. The mean annual precipitation is about 35 to 45 inches and occurs mostly as snow. The average annual air temperature is 36 to 40 degrees F.

Cagwin soils are similar to Arkson, Corbett, Mottsville, and Vicee soils. Cagwin soils are near Glenbrook, Tarloc, Toem, and Vicee soils. Arkson and Vicee soils have a gravelly very fine sandy loam or loam C horizon. Corbett soils are loamy coarse sand and loamy sand throughout the profile. Mottsville soils do not have rock at a depth of 60 inches. Glenbrook and Toem soils are shallow over granitic bedrock.

Typical pedon of a Cagwin gravelly sand in an area of Cagwin-Toem complex, 30 to 75 percent slopes, about 500 feet south of the northeast corner of sec. 19, T. 15 N., R. 19 E.:

A11—0 to 1 inch; grayish brown (10YR 5/2) very gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grained; loose when dry or moist; common very fine and fine roots; many very fine and fine interstitial pores; slightly acid; clear smooth boundary.

A12—1 to 7 inches; grayish brown (10YR 5/2) gravelly sand, dark brown (10YR 3/3) moist; single grained; loose when dry or moist; common very fine and fine roots and few medium and coarse roots; many very fine and fine interstitial pores; slightly acid; clear wavy boundary.

C1—7 to 40 inches; pale brown (10YR 6/3) gravelly coarse sand, dark brown (10YR 3/3) moist; single grained; loose when dry or moist; common very fine roots and few fine and medium roots; many very fine and fine interstitial pores; slightly acid; abrupt irregular boundary.

C2r—40 to 47 inches; white and gray (10YR 8/1 and 5/1) weathered granitic bedrock.

The depth to bedrock ranges from 20 to 40 inches. The A horizon has value of 4 or 5 when dry and chroma of 2 or 3. It is coarse loamy sand or gravelly sand. Total organic matter content is less than 1 percent in the upper 10 inches. The C horizon has value of 5 or 6 and chroma of 3 or 4. It is gravelly coarse sand or gravelly sand.

Corbett series

The Corbett series consists of moderately deep, somewhat excessively drained soils on mountainsides. These soils formed in colluvium from granitic bedrock. Slope ranges from 8 to 75 percent. The average annual precipitation, which occurs mostly as snow, is 30 to 45 inches, and the average annual air temperature is 37 to 45 degrees F.

Corbett soils are similar to Arkson, Aldax Variant, Cagwin, Mottsville, and Vicee soils. They are near Arkson, Aldax Variant, Glenbrook, Tarloc Variant, Toem, and Toiyabe soils. Arkson and Vicee soils have a gravelly very fine sandy loam C horizon. Cagwin soils are colder than Corbett soils, and Mottsville soils are warmer than Corbett soils. Aldax Variant, Glenbrook, Toem, and Toiyabe soils are shallow over bedock. Tarloc Variant soils have a gravelly coarse sandy loam B2t horizon.

Typical pedon of Corbett gravelly sand, 30 to 50 percent slopes, 2 miles south and 4 miles west of Carson City, about 0.4 mile south and 0.1 mile west of the northeast corner of sec. 28, T. 15 N., R. 19 E.:

A11—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly sand, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable; few very fine roots; many fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid; clear smooth boundary.

A12—4 to 8 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; common very fine, fine, and medium roots; many very fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid; clear wavy boundary.

C1—8 to 22 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, dark brown (10YR 4/3) moist; massive; soft, very friable; few very fine and fine roots and common medium roots; many fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid; clear wavy boundary.

C2—22 to 40 inches; light gray (10YR 7/2) gravelly loamy coarse sand, pale brown (10YR 6/3) moist; massive; slightly hard, very friable; few very fine, fine, and medium roots; many fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid; abrupt irregular boundary.

C3r—40 to 54 inches; white and light gray (10YR 8/1 and 6/1) weathered granitic bedrock.

The depth to bedrock is 24 to 40 inches. The content of gravel or cobbles, or both, between depths of 10 and 40 inches is less than 35 percent. The A1 horizon has value of 2 or 3 when moist and chroma of 2 or 3. It is loamy coarse sand or coarse sand. The C horizon commonly is loamy coarse sand or coarse sand, and in places it is gravelly.

Cradlebaugh series

The Cradlebaugh series consists of deep, poorly drained soils on smooth flood plains. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 10 to 12 inches, and the average annual air temperature is 48 or 49 degrees F.

Cradlebaugh soils are similar to and are near Bishop, Jubilee, Kimmerling, Orizaba, and Voltaire soils. Bishop, Jubilee, Kimmerling, and Voltaire soils do not have silica-cemented durinodes. Orizaba soils have a light colored surface layer.

Typical pedon of Cradlebaugh loam, strongly saline-alkali, 3 1/2 miles southeast of Carson City, about 500 feet east and 1,500 feet north of the southwest corner of sec. 23, T. 15 N., R. 20 E.:

A11—0 to 6 inches; dark gray (10YR 4/1) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores and few fine tubular pores; effervescent; strongly alkaline; clear wavy boundary.

A12—6 to 22 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; few fine distinct dark gray (10YR 4/1) mottles; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; strongly effervescent; strongly alkaline; abrupt wavy boundary.

Csica—22 to 60 inches; light brownish gray (2.5Y 6/2) crudely stratified fine sandy loam to clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine and medium dark grayish brown (2.5Y 4/2) mottles and few medium and coarse dark gray (N 4/) mottles; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; weak very thin discontinuous silica-cemented strata; strongly effervescent; strongly alkaline.

The depth to a horizon that has weak silica cementation or durinodes commonly ranges from about 18 to 30 inches. Where land-leveling cuts have been made, however, the depth is as little as 10 inches. The C horizon has hue of 2.5Y or 5Y or is neutral; value of 6 or 7 when dry and 3 or 4 when moist; and chroma of 2 or 3. In places it has very thin, discontinuous, silica-cemented strata or durinodes. The content of durinodes commonly ranges from 20 to 40 percent but is as much as 90 percent in places.

Dalzell series

The Dalzell series consists of moderately deep, moderately well drained soils on smooth flood plains and low alluvial fans. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 10 inches, and the average annual air temperature is 49 to 51 degrees F.

Dalzell soils are similar to Dalzell Variant and Fettic Variant soils and are near Vamp soils. Dalzell Variant soils have a gravelly clay B2t horizon. Fettic Variant soils are shallow over a strongly cemented duripan. Vamp soils are somewhat poorly drained and do not have a clay loam B2t horizon.

Typical pedon of Dalzell fine sandy loam, deep water table, 1/2 mile east of Carson City, 0.3 mile west and 0.4 mile south of the northeast corner of sec. 8, T. 15 N., R. 20 E.:

A11—0 to 2 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grained; loose when dry or moist; many very fine and fine interstitial pores; mildly alkaline; abrupt smooth boundary.

A12—2 to 8 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; common very fine tubular pores; mildly alkaline; clear smooth boundary.

A2—8 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 3/3) moist; moderate very thick platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few very fine and fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B2t—10 to 20 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; very dark grayish brown (10YR 3/2) organic coatings on ped faces; strong coarse and very coarse columnar structure; very hard, firm, sticky and plastic; many moderately thick clay films coating pores; slightly effervescent; strongly alkaline; clear smooth boundary.

C1ca—20 to 31 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; few fine tubular pores; slightly effervescent; thin lenticular layers of soft lime 1 to 3 millimeters thick; strongly alkaline; abrupt smooth boundary.

B2tb—31 to 39 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate thick platy structure; hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; slightly effervescent; strongly alkaline; abrupt smooth boundary.

C2sicam—39 to 60 inches; very pale brown (10YR 7/3) strong cemented duripan that has a cap 1 to 3 millimeters thick; common fine olive (5Y 4/3) and black (10YR 2/1) mottles; violently effervescent.

The depth to the duripan ranges from 30 to 40 inches. The depth to the natric horizon is 4 to 15 inches. The A1 horizon has value of 4 to 6 when dry and 3 or 4 when moist. It is fine sandy loam, loam, or loamy sand. The B2t horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. It is loam or clay loam. It is more than 15 percent exchangeable sodium. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 3 or 4 when moist, and chroma of 2 to 4. It ranges from fine sandy loam to sandy clay loam.

Dalzell Variant

The Dalzell Variant consists of deep, well drained soils on undulating terraces. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 4 percent. The average annual precipitation is about 10 inches, and the average annual air temperature is about 49 degrees F.

Dalzell Variant soils are similar to Dalzell, Greenbrae, and Reno soils and are near Haybourne soils. Dalzell soils have a clay loam B2t horizon. Greenbrae soils have a sandy clay loam B2t horizon. Reno soils have a hardpan at a depth of about 24 inches. Haybourne soils have a gravelly sandy loam B horizon.

Typical pedon of Dalzell Variant fine sandy loam, 0 to 4 percent slopes, 2 miles east of Carson City, 0.3 mile west and 0.1 mile north of the southeast corner of sec. 10, T. 15 N., R. 20 E.:

A11—0 to 3 inches; light brownish gray (10YR 6/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine vesicular pores; mildly alkaline; abrupt smooth boundary.

A12—3 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B2t—10 to 18 inches; dark brown (7.5YR 4/2) gravelly clay, dark yellowish brown (10YR 4/4) moist; dark brown (7.5YR 3/2) coatings on ped faces; strong very coarse prismatic structure; hard, friable, very sticky and very plastic; few fine roots between prisms; few fine tubular pores; many pressure faces and few slickensides; mildly alkaline; clear wavy boundary.

B3—18 to 25 inches; dark brown (10YR 4/3) clay loam, dark yellowish brown (10YR 4/3) moist; massive; slightly hard, friable, sticky and plastic; few fine and very fine roots; many fine and very fine interstitial pores and common fine tubular pores; few fine black (10YR 2/1) concretions; moderately alkaline; clear smooth boundary.

C1sica—25 to 36 inches; light gray (10YR 7/2) loam, dark brown (10YR 3/3) moist; massive; very hard, very firm, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine tubular pores; weakly silica cemented; few fine black (10YR 2/1) concretions; strongly effervescent; strongly alkaline; abrupt smooth boundary.

C2ca—36 to 41 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; strong medium to very thick platy structure; slightly hard, very friable, nonsticky and slightly plastic; few very fine and fine roots; many very fine tubular pores; strongly effervescent; thin white (10YR 8/1) lime coating on ped faces; strongly alkaline; clear smooth boundary.

C3ca—41 to 60 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 4/3) moist; white (10YR 8/1) lime coating fracture planes; strong very thick platy structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine tubular pores; strongly effervescent; strongly alkaline.

The solum ranges from 13 to 30 inches in thickness. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 1 to 3. It is fine sandy loam or loam and is gravelly in places. The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is clay loam or clay. The C horizon is loam or fine sandy loam and is gravelly in some pedons.

Deven series

The Deven series consists of shallow, well drained soils on hills and mountains. These soils formed in residuum from andesite or basalt. Slope ranges from 4 to 50 percent. The average annual precipitation is 12 to 14 inches, and the average annual air temperature is 49 to 51 degrees F.

Deven soils are similar to Cagle, Oppio, and Xerta soils. They are near Cagle, Nosrac, and Xerta soils. Cagle and Oppio soils are moderately deep over bedrock. Xerta soils have a hardpan that is underlain by bedrock, and they are moderately deep. Nosrac soils are deep and have a very gravelly clay loam B2t horizon.

Typical pedon of a Deven very cobbly loam in an area of Deven-Rock outcrop complex, 4 to 15 percent slopes, 9 miles east of Carson City, about 500 feet north and 700 feet west of the southeast corner of sec. 11, T. 15 N., R. 21 E.:

A1—0 to 3 inches; light brownish gray (10YR 6/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; 30 percent gravel, 30 percent cobbles, and 5 percent stones; moderately alkaline; clear smooth boundary.

B21t—3 to 6 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots and few medium roots; common very fine tubular pores; few thin clay films coating ped faces and pores; 20 percent gravel; mildly alkaline; clear smooth boundary.

B22t—6 to 9 inches; brown (10YR 5/3) clay, dark yellowish brown (10YR 3/4) moist; strong medium angular blocky structure; hard, firm, very sticky and plastic; common very fine and fine roots; common very fine tubular pores; common thin clay films on ped faces and in pores; mildly alkaline; abrupt irregular boundary.

R—9 to 11 inches; andesitic bedrock that has a thin discontinuous cap of lime and silica less than 5 millimeters thick.

The thickness of the solum and the depth to bedrock are 8 to 20 inches. The surface is covered by 30 to 40 percent cobbles and 30 to 50 percent gravel. The profile has hue of 10YR or 7.5YR. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It has weak, fine or medium, subangular blocky or granular structure, or it is massive. The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist and has chroma of 2 to 4. It has fine or medium, subangular blocky, angular blocky, or prismatic structure. It is heavy clay loam or clay and in places is as much as 20 percent gravel.

Fettic Variant

The Fettic Variant consists of shallow, moderately well drained, saline-alkali affected soils on slightly convex alluvial fans. These soils formed in alluvium from mixed material. Slope ranges from 2 to 4 percent. The salts and alkali have precipitated from the adjacent hot springs. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 48 to 49 degrees F.

Fettic Variant soils are similar to Dalzell and Vamp soils. They are near Voltaire soils. Dalzell soils have a light colored surface layer. Vamp soils have a fine sandy loam subsoil. Voltaire soils do not have cementation in the profile.

Typical pedon of Fettic Variant very fine sandy loam, 2 to 4 percent slopes, 2,100 feet south of the northeast corner of sec. 8, T. 14 N., R. 20 E.:

A11—0 to 2 inches; grayish brown (2.5Y 5/2) very fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate thick platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many fine and medium vesicular pores; moderately alkaline; abrupt smooth boundary.

A12—2 to 5 inches; grayish brown (2.5Y 5/2) very fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; moderately alkaline; abrupt smooth boundary.

B2t—5 to 10 inches; light olive brown (2.5Y 5/4) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure; very hard, friable, sticky and plastic; common very fine and fine roots; many very fine and fine tubular pores; common thin clay films on ped faces and in pores; few to common medium distinct black (10YR 2/1) organic stains on ped faces; moderately alkaline; abrupt smooth boundary.

C3sicam—10 to 36 inches; brown (10YR 5/3) and light grayish brown (10YR 6/2) thinly stratified strongly silica-cemented duripan; massive; very hard and hard, very firm and firm, brittle; few very fine and fine roots; matting on duripan surface; effervescent; strongly alkaline; abrupt smooth boundary.

C4sica—36 to 60 inches; brown (10YR 5/3) sandy clay loam that is weakly silica cemented, brown moist; few and common distinct mottles of yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); massive; very hard and hard, firm and friable, sticky and plastic; very few very fine and fine roots; few very fine and fine tubular pores; few silica- and lime-cemented nodules; violently effervescent in nodules; strongly alkaline.

Depth to the duripan is 10 to 20 inches. The A horizon ranges from 4 to 9 inches in thickness. It has weak to moderate structure. Structure in the B horizon ranges from moderate to strong in grade and from fine to medium in size. In some pedons the duripan is at a depth of more than 36 inches.

Glenbrook series

The Glenbrook series consists of shallow, somewhat excessively drained soils on uplands. These soils formed in residuum from granitic bedrock. Slope ranges from 4 to 75 percent. The average annual precipitation is about 10 to 14 inches, and the average annual air temperature is about 48 to 51 degrees F.

Glenbrook soils are similar to Aldax, Toem, and Toiyabe soils. Glenbrook soils are near Corbett, Koontz, Mottsville, Tarloc, and Tarloc Variant soils. Aldax soils have fine sandy loam texture. Toem and Toiyabe soils are colder. Corbett, Tarloc, and Tarloc Variant soils are moderately deep over bedrock. Koontz, Mottsville, and Sutro Variant soils are deep.

Typical pedon of a Glenbrook gravelly loamy coarse sand in an area of Glenbrook-Rock outcrop complex, 30 to 50 percent slopes, 2 miles south and 1 mile west of Carson City, about 0.2 mile east and 0.1 mile south of the northwest corner of sec. 31, T. 15 N., R. 20 E.:

A1—0 to 4 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; common very fine and fine roots; many fine and medium interstitial pores; neutral; clear smooth boundary.

C1—4 to 14 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; few very fine, fine, and medium roots; many fine and very fine interstitial pores; neutral; abrupt irregular boundary.

C2r—14 to 24 inches; weathered granitic bedrock.

Depth to weathered granitic bedrock is about 10 to 20 inches. The solum is sand, coarse sand, or loamy coarse sand. It is 15 to 25 percent coarse fragments, mostly fine gravel.

Greenbrae series

The Greenbrae series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 8 percent. The average annual precipitation is about 10 inches, and the average annual air temperature is about 50 degrees F.

Greenbrae soils are similar to Dalzell Variant, Prey, and McFaul soils. They are near Haybourne and Surprise soils. Dalzell Variant soils have a clay B2t horizon. Prey soils have a coarse sandy loam B2t horizon and a hardpan that is moderately deep in the profile. McFaul soils have a clay loam B2t horizon and a sandy or gravelly sand C horizon. Haybourne and Surprise soils have a gravelly sandy loam C horizon.

Typical pedon of Greenbrae gravelly sandy loam, 4 to 8 percent slopes, 3 miles east of Carson City, about 0.1 mile west and 0.4 mile north of the southeast corner of sec. 11, T. 15 N., R. 20 E.:

A1—0 to 10 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine tubular pores and many very fine interstitial pores; neutral; abrupt smooth boundary.

B21t—10 to 15 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; hard, very friable, sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores and few fine interstitial pores; few thin clay films on ped faces and bridging sand grains; neutral; clear smooth boundary.

B22t—15 to 30 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; strong coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores and many very fine interstitial pores; common thin clay films and few moderately thick clay films on ped faces; neutral; clear smooth boundary.

B3t—30 to 36 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine tubular pores and many fine interstitial pores; common thin clay films bridging sand grains; mildly alkaline; clear smooth boundary.

C—36 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; mildly alkaline.

The solum ranges from 28 to 34 inches in thickness. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist. It is less than 1 percent organic matter. The B horizon has chroma of 2 or 3. In the upper 20 inches of this horizon, the average clay content is 27 to 35 percent. The B horizon is dominantly sandy clay loam, but in places it has layers of sandy clay. The C horizon is stratified gravelly sandy loam, sandy loam, or loam.

Haybourne series

The Haybourne series consists of deep, well drained soils on alluvial fans. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 15 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Haybourne soils are similar to Surprise soils. Haybourne soils are near Dalzell Variant, Greenbrae, Prey, Sagouspe, and Toll soils. Surprise soils have a dark-colored surface layer. Dalzell Variant soils have a clayey B2t horizon. Greenbrae soils have a sandy clay loam B2t horizon. Prey soils have a sandy loam B2t horizon. Sagouspe and Toll soils are sandy.

Typical pedon of Haybourne gravelly sandy loam, 2 to 4 percent slopes, 3 miles south and 1 mile east of Carson City, about 0.2 mile west and 0.1 mile south of the northeast corner of sec. 4, T. 14 N., R. 20 E.:

A11—0 to 2 inches; light brownish gray (10YR 6/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

A12—2 to 6 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

B2—6 to 25 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores and common medium pores; mildly alkaline; clear smooth boundary.

C1—25 to 36 inches; very pale brown (10YR 7/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine interstitial pores and few fine tubular pores; mildly alkaline; clear smooth boundary.

C2—36 to 60 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine roots; many fine interstitial and tubular pores; mildly alkaline.

The solum ranges from 20 to 30 inches in thickness. The part of the profile between depths of 10 and 40 inches is sandy loam or fine sandy loam and is about 10 to 25 percent gravel. The A horizon is grayish brown or light grayish brown. It is gravelly sandy loam, sandy loam, or sand. The B horizon is grayish brown or light brownish gray. It has subangular blocky structure, or it is massive. The C horizon is light brownish gray, pale brown, or very pale brown. It is stratified and is massive or single grained.

Histic Haplaquolls

Histic Haplaquolls are deep, very poorly drained soils in old channels on flood plains. These soils formed in loamy alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 10 inches, and the average annual air temperature is about 48 degrees F.

Histic Haplaquolls are similar to and are near Bishop, Cradlebaugh, Jubilee, Kimmerling, and Voltaire soils. None of the similar and nearby soils have a peat surface layer. Bishop soils are calcareous. Cradlebaugh soils have silica-cemented nodules. Jubilee soils have a sandy loam C horizon. Kimmerling soils are mottled at a depth of more than 15 inches. Voltaire soils are mottled below a depth of 18 inches.

Reference pedon of a Histic Haplaquoll in an area of Histic Haplaquolls, nearly level, 2 miles east and 1 mile south of Carson City, about 0.5 mile north of the southwest corner of sec. 23, T. 15 N., R. 20 E.:

O1—0 to 9 inches; black (10YR 2/1) moist peat, mostly fibrous.

A11g—9 to 27 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; gleyed olive gray (5Y 4/2), olive (5Y 4/4), and strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, slightly sticky and plastic; many very fine roots; neutral.

A12g—27 to 45 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; massive; hard, very friable, sticky and plastic; many very fine roots; neutral.

C—45 to 60 inches; light olive gray (5Y 6/2) stratified loam and sand, olive gray (5Y 4/2) moist; many coarse faint olive (5Y 4/4) mottles; massive; hard, very friable, nonsticky and nonplastic; neutral.

The water table is above the mineral soil most of the year. Burning has reduced the thickness of the histic epipedon in some pedons. The C horizon has medium to high organic matter content. It is stratified loam, silt loam, or silty clay loam. Sand and gravel are below a depth of 30 inches in places. The C horizon has hue of 10YR or 5Y, and it has mottles in hue of 5Y, 5GY, or 5BG.

Hocar series

The Hocar series consists of shallow, well drained soils on low mountains. These soils formed in residuum and colluvium from metasedimentary rock. Slope ranges from 15 to 50 percent. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 47 to 51 degrees F.

Hocar soils are similar to Aldax, Koontz, and Old Camp soils. They are near Incy, Prey, Sutro, and Ursine Variant soils. Aldax soils are noncalcareous. Koontz and Old Camp

soils are noncalcareous and have a very gravelly and very stony clay loam B2t horizon. Incy soils are sandy throughout. Prey soils have a gravelly coarse sandy loam B22t horizon. Sutro soils are moderately deep and noncalcareous. Ursine Variant soils have a hardpan at a shallow depth.

Typical pedon of a Hocar gravelly loam in an area of Hocar-Rock outcrop complex, 15 to 50 percent slopes, 5 miles east and 3 miles south of Carson City and about 1,320 feet west and 2,600 feet south of the northeast corner of sec. 25, T. 15 N., R. 20 E.:

O1—1 inch to 0; pine litter.

A11—0 to 3 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; 30 percent gravel; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A12—3 to 7 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; 30 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—7 to 17 inches; gray (10YR 6/1) very gravelly loam, dark gray (10YR 4/1) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; 50 percent gravel; slightly effervescent; many fine light gray (10YR 7/1) lime filaments and coatings on gravel faces; moderately alkaline; abrupt irregular boundary.

C2r—17 to 23 inches; weathered metasedimentary bedrock.

The thickness of the solum and the depth to bedrock are 7 to 20 inches. The A1 horizon has value of 4 or 5 when dry and 3 or 4 when moist and has chroma of 1 to 3. It is 25 to 40 percent gravel. The C horizon has value of 6 or 7 when dry and 4 to 6 when moist and has chroma of 1 to 4. It is 40 to 85 percent gravel. The C2r horizon is weathered and fractured in the upper 3 to 7 inches.

Holbrook series

The Holbrook series consists of deep, well drained soils on alluvial fans and in drainageways. These soils formed in mixed alluvium. Slope ranges from 4 to 15 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 48 to 51 degrees F.

Holbrook soils are similar to Holbrook Variant and Sutro Variant soils. They are near Jubilee and Surprise soils. Holbrook Variant soils have a light colored surface layer and are moderately deep. Sutro Variant soils have loam or very fine sandy loam B2 and C1 horizons. Jubilee soils are poorly drained and very poorly drained. Surprise soils have gravelly sandy loam B2 and C1 horizons.

Typical pedon of Holbrook gravelly fine sandy loam, 4 to 8 percent slopes, 1 mile west of Carson City, about 0.3 mile north and 0.5 mile west of the southeast corner of sec. 13, T. 15 N., R. 19 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) gravelly fine sandy loam, very dark gray (10YR 3/1) moist; moderate coarse platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine tubular pores; slightly acid; abrupt smooth boundary.

A12—2 to 9 inches; dark brownish gray (10YR 4/2) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

A13—9 to 15 inches; dark brownish gray (10YR 4/2) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular pores; neutral; gradual smooth boundary.

C1—15 to 60 inches; brown (10YR 5/3) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine tubular pores; neutral.

The A horizon is 10 to 20 inches thick. It has value of 4 or 5 when dry and chroma of 1 to 3 when moist. The part of the profile between depths of 10 and 40 inches is stratified sand, loamy sand, sandy loam, fine sandy loam, and loam; the average texture is sandy loam. The content of rock fragments, mainly gravel, cobbles, or stones, averages 35 to 50 percent. The C horizon has value of 5 or 6 when dry and 4 or 5 when moist and has chroma of 2 or 3. It is slightly acid to neutral.

Holbrook Variant

The Holbrook Variant consists of moderately deep, well drained soils on low mountains and hills. These soils formed in colluvium from basaltic rock. Slope ranges from 30 to 75 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 45 to 49 degrees F.

Holbrook Variant soils are similar to Aldax, Holbrook, and Sutro soils. They are near Cagle, Deven, and Old Camp soils. Aldax soils are shallow. Sutro soils are moderately deep and have a gravelly loam B2 horizon. Holbrook soils are deep. Cagle soils are moderately deep and have a clayey B horizon. Old Camp soils are shallow and have a B2t horizon that is commonly clay loam but is sandy clay loam in places.

Typical pedon of Holbrook Variant very stony fine sandy loam in an area of Holbrook Variant-Rock outcrop complex, 30 to 75 percent slopes, 4 miles north of Carson City, about 0.3 mile west of northeast corner of sec. 29, T. 16 N., R. 20 E.:

A11—0 to 2 inches; light brownish gray (10YR 6/2) very stony loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; few fine roots; common very fine and fine tubular pores; neutral; clear smooth boundary.

A12—2 to 8 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 50 percent gravel; neutral; clear smooth boundary.

B2—8 to 24 inches; pale brown (10YR 6/3) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; about 75 percent gravel; neutral; abrupt irregular boundary.

R—24 inches; creviced basalt.

Depth to bedrock is 20 to 40 inches. The profile has hue of 10YR or 7.5YR. The A1 horizon generally has value of 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is very stony or extremely stony. The B2 horizon generally has value of 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is 40 to 75 percent gravel, most of which is angular.

Incy series

The Incy series consists of deep, excessively drained soils on alluvial fans, terraces, and uplands. These soils formed in eolian sand derived from mixed rock that was dominantly granite. Slope ranges from 4 to 30 percent. The average annual precipitation is 8 to 12 inches, and the average annual air temperature is 49 to 52 degrees F.

Incy soils are similar to Mottsville, Sagouspe, and Toll soils. They are near Aldax, Hocar, and Indiano soils. Mottsville soils have a dark colored surface layer. Sagouspe soils are wet. Toll soils are loamy sand. Aldax soils are shallow. Hocar soils are shallow and calcareous. Indiano soils are moderately deep and have a clay loam or sandy clay loam B2t horizon.

Typical pedon of Incy fine sand, 4 to 30 percent slopes, 5 miles east and 6 miles south of Carson City, about 100 feet east and 500 feet north of the southwest corner of sec. 12, T. 14 N., R. 20 E.:

C—0 to 60 inches; pale brown (10YR 6/3) fine sand, dark grayish brown (10YR 4/2) moist; single grained; many very fine and fine roots; many very fine interstitial pores; neutral.

The upper 0 to 10 inches of the profile is medium sand in some pedons. Value is 6 or 7 throughout the profile when dry and 4 or 5 when moist. Chroma is 1 to 3.

Indiano series

The Indiano series consists of moderately deep, well drained soils on uplands. These soils formed in residuum from rhyolitic or altered rock. Slope ranges from 15 to 50 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 48 to 51 degrees F.

Indiano soils are similar to Indiano Variant, Nosrac, Old Camp, and Oppio soils. They are near Aldax, Incy, and McFaul soils. Indiano Variant soils have a light colored surface layer. Nosrac soils are deep and have a very gravelly clay loam B2t horizon. Old Camp soils are shallow and have a very gravelly clay loam B2t horizon. Aldax soils are shallow and are very stony fine sandy loam. McFaul soils have a sandy clay loam B2t horizon and are deep.

Typical pedon of an Indiano stony fine sandy loam in an area of Aldax-Indiano association, on the west side of Hot Springs Mountain, about 800 feet west and 1,500 feet north of the southeast corner of sec. 16, T. 14 N., R. 20 E.:

A1—0 to 6 inches; brown (10YR 5/3) stony fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; many very fine and fine tubular pores; 40 percent stones, cobbles, and gravel; slightly acid; gradual smooth boundary.

A3—6 to 13 inches; brown (10YR 5/3) gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; many very fine and fine tubular pores; 15 percent gravel and 10 percent cobbles; slightly acid; clear smooth boundary.

B2t—13 to 24 inches; light yellowish brown (10YR 6/4) gravelly clay loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and plastic; common very fine roots and few fine and medium roots; many very fine pores and common medium tubular pores; thin continuous clay films in pores; many clay films bridging mineral grains; 15 percent gravel and 5 percent cobbles; slightly acid; gradual wavy boundary.

B3t—24 to 33 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; common thin clay films in pores; few clay films bridging mineral grains; slightly acid; abrupt irregular boundary.

R—33 to 37 inches; weathered rhyolite becomes hard at a depth of 37 inches.

The thickness of the solum and the depth to bedrock are 20 to 40 inches. The solum is slightly acid or neutral. It has hue of 10YR to 7.5YR. The A1 horizon has value of 4 or 5 when dry and has chroma of 2 or 3. An A3 or B1 horizon occurs in most pedons. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist and has chroma of 3 or 4. It is clay loam or sandy clay loam that is 10 to 35 percent gravel and cobbles. Bedrock consists of rhyolite or other altered volcanic rock and commonly is weathered in the upper 1 inch to 4 inches.

Indiano Variant

The Indiano Variant consists of moderately deep, well drained soils on uplands. These soils formed in loamy alluvium from metavolcanic rock. Slope ranges from 4 to 15 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Indiano Variant soils are similar to Indiano, Koontz, Old Camp, and Oppio soils. They are near Haybourne, Incy, and Surprise soils. Indiano soils have a dark colored surface layer. Koontz and Old Camp soils are shallow. Oppio soils have a clayey B horizon. Haybourne and Surprise soils are deep and have sandy loam and gravelly sandy loam B and C horizons. Incy soils are sandy throughout the profile.

Typical pedon of Indiano Variant gravelly fine sandy loam, 4 to 15 percent slopes, 2 miles south and 1 mile east of Carson City, about 0.4 mile west and 0.3 mile north of the southeast corner of sec. 28, T. 15 N., R. 20 E.:

A11—0 to 4 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grained; loose; many very fine roots and few fine and medium roots; many very fine interstitial pores; mildly alkaline; abrupt smooth boundary.

A12—4 to 11 inches; light brownish gray (10YR 6/2) gravelly fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine tubular pores; 20 percent gravel; mildly alkaline; abrupt smooth boundary.

B1—11 to 16 inches; pale brown (10YR 6/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine and medium roots; common very fine tubular pores; common thin clay films coating and bridging sand grains and common thin clay films on ped faces; 20 percent gravel; neutral; abrupt smooth boundary.

B21t—16 to 27 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; few fine and medium roots; few medium tubular pores and few fine tubular exped pores; many thin clay films on ped faces and in pores; 30 percent gravel; neutral; abrupt wavy boundary.

B22t—27 to 29 inches; dark yellowish brown (10YR 4/4) very gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; common thin clay films on bridging and coating sand grains; 90 percent gravel; neutral; abrupt irregular boundary.

R—29 inches; metavolcanic bedrock.

Thickness of the solum and depth to bedrock range from 14 to 40 inches. The solum is 40 to 90 percent gravel. The A horizon is less than 1 percent organic matter. It has hue of 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. It is 15 to 30 percent gravel. The B horizon has hue of 10YR and 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. It is fine sandy loam, sandy clay loam, loam, or clay loam.

Jubilee series

The Jubilee series consists of deep, poorly drained soils on flood plains and deltaic alluvial fans. These soils formed in mixed alluvium from metavolcanic and granitic rock. Slope ranges from 0 to 4 percent. The average annual precipitation is 8 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Jubilee soils are similar to Bishop and Cradlebaugh soils. They are near Histic Haplaquolls and Kimmerling and Voltaire soils. Kimmerling soils are clay loam or silty clay between depths of 10 and 40 inches. Voltaire soils are silty clay loam or clay loam and are more than 35 percent clay in at least half of the part of the profile between depths of 10 and 40 inches. Cradlebaugh soils have discontinuous silica cementing at a moderate depth in the profile. Bishop soils are moderately or moderately slowly permeable. Histic Haplaquolls have an O horizon of peat about 9 inches thick.

Typical pedon of Jubilee coarse sandy loam, 0 to 2 percent slopes, 1 mile south of the headquarters of the Nevada State Minimum Security Prison, about 1,300 feet east and 1,400 feet south of the northwest corner of sec. 9, T. 14 N., R. 20 E.:

A11—0 to 3 inches; dark grayish brown (10YR 4/2) coarse sandy loam, black (10YR 2/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine tubular pores; neutral; abrupt smooth boundary.

A12—3 to 20 inches; dark grayish brown (10YR 4/2) coarse sandy loam, black (10YR 2/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

C1—20 to 40 inches; grayish brown (2.5Y 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; common medium distinct dark brown (7.5YR 3/2) and dark olive gray (5Y 3/2) mottles; massive; hard, very friable, nonsticky and nonplastic; many very fine roots and few fine roots; many very fine tubular pores; neutral; clear smooth boundary.

C2—40 to 50 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; common large and small prominent dark olive gray (5Y 3/2) and olive (5Y 4/4) mottles; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; neutral; clear wavy boundary.

C3—50 to 60 inches; grayish brown (2.5Y 5/2) sand, brown (10YR 5/3) moist; common small and large prominent dark reddish brown (5YR 3/4) and reddish brown (5YR 4/4) mottles; single grained; loose; few very fine roots; many very fine and fine interstitial pores; neutral.

The A horizon is 15 to 20 inches thick. It is coarse sandy loam, loam, fine sandy loam, or sand. It has value of 4 or 5 when dry and 2 or 3 when moist and has chroma of 1 or 2. The C horizon has value of 5 or 6 when dry and 3 to 5 when moist and has chroma of 2 or 3. It is stratified sand, sandy loam, or fine sandy loam and in places has thin layers of loam.

Kimmerling series

The Kimmerling series consists of deep, poorly drained soils on flood plains. These soils formed in alluvium from mixed rock, mainly granite and smaller amounts of basalt, rhyolite, gneiss, and slate. Slope ranges from 0 to 2 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Kimmerling soils are similar to and are near Bishop and Cradlebaugh soils. They are near Voltaire and Jubilee soils and Histic Haplaquolls. Bishop soils are moderately permeable or moderately slowly permeable. Cradlebaugh soils have discontinuous silica cementation at a moderate depth in the profile. Voltaire soils have an A horizon less than 24 inches thick and are silty clay loam or clay loam that is more than 35 percent clay in at least half of the part of the profile between depths of 10 and 40 inches. Jubilee soils are moderately permeable. Histic Haplaquolls have an O horizon of peat about 9 inches thick.

Typical pedon of Kimmerling silty clay loam, 1,300 feet west of Nevada State Prison, 2,280 feet east and 100 feet north of the southwest corner of sec. 16, T. 15 N., R. 20 E.:

A11—0 to 15 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; massive; hard, friable, sticky and plastic; mildly alkaline; clear smooth boundary.

A12—15 to 25 inches; grayish brown (10YR 5/2) silty clay loam, very dark brown (10YR 2/2) moist; common fine mottles of brown (10YR 4/3) and very dark gray (10YR 3/1); massive; hard, friable, sticky and plastic; mildly alkaline; abrupt smooth boundary.

C1—25 to 36 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 2/2) moist; many fine and medium mottles of dark gray (10YR 4/1), dark yellowish brown (10YR 4/4), and black (10YR 2/1); massive; slightly hard, very friable, slightly sticky and slightly plastic; mildly alkaline; abrupt smooth boundary.

A1b—36 to 45 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; many fine mottles of black (10YR 2/1) massive; hard, friable, sticky and plastic; mildly alkaline; abrupt smooth boundary.

C2—45 to 52 inches; pale olive (5Y 6/3) silt loam, olive (5Y 4/3) moist; many large mottles of brown (7.5YR 4/4 and 3/2) and manganese nodules that are black (10YR 2/1) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; mildly alkaline; abrupt smooth boundary.

C3—52 to 56 inches; light olive gray (5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; many fine mottles with moist colors of olive (5Y 4/4) and black (5Y 2/1); massive; hard, friable, sticky and plastic; mildly alkaline; abrupt smooth boundary.

C4—56 to 60 inches; light olive gray (5Y 6/2) silty clay loam, dark greenish gray (5G 4/1) moist; massive; hard, friable, sticky and plastic; mildly alkaline.

The profile is neutral to mildly alkaline. The texture between depths of 10 and 40 inches in places is stratified silty clay loam, silt loam, and clay loam. Thin strata of sand and loamy sand are in some pedons. The A horizon has hue of 10YR or 2.5Y, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The C horizon has hue of 10YR, 2.5Y, or 5Y and is commonly gleyed at a depth of more than 30 inches. It has value of 2 to 5 when moist and has chroma of 1 to 3. Mottles have hue of 10YR, 7.5YR, 2.5Y, or 5Y; value of 2 to 5 when moist; and chroma of 1 to 4. A buried A horizon is present in most pedons.

Koontz series

The Koontz series consists of shallow, well drained soils on uplands or low mountains. These soils formed in residuum and colluvium from metavolcanic rock. Slope ranges from 15 to 50 percent. The average annual precipitation is about 10 to 14 inches, and the average annual air temperature is 48 to 52 degrees F.

Koontz soils are similar to Aldax, Hocar, and Old Camp soils. They are near Cagle, Glenbrook, and Nosrac soils. Aldax soils are stony or very stony fine sandy loam. Hocar soils are calcareous. Cagle soils are moderately deep. Glenbrook soils do not have a B2t horizon. Old Camp soils have a B2t horizon that is dominantly clay loam but is sandy clay loam or loam in places.

Typical pedon of a Koontz very gravelly loam in an area of Koontz-Sutro complex, 15 to 30 percent slopes, 3 miles south and 9 miles east of Carson City, about 1,000 feet north and 500 feet west of the southeast corner of sec. 33, T. 15 N., R. 21 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 50 percent gravel; mildly alkaline; abrupt smooth boundary.

A12—2 to 9 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 40 percent gravel; mildly alkaline; clear wavy boundary.

B2t—9 to 14 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; common fine and medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine, fine, and medium roots; common very fine tubular pores; common thin clay films on faces of peds and in pores; 45 percent gravel; mildly alkaline; clear irregular boundary.

Cr—14 to 42 inches; weathered metavolcanic bedrock that is fractured; root mats occur in the crevices.

The thickness of the solum and the depth to bedrock are 8 to 20 inches. The A horizon has hue of 10YR, value of 4 to 6 when dry and 2 to 4 when moist, and chroma of 2 or 3. It is 35 to 60 percent gravel. It is neutral or mildly alkaline. The B2t horizon has value of 4 to 6 when dry and 3 or 4 when moist and has chroma of 2 to 4. It is loam or clay loam that is 40 to 65 percent gravel and 1 to 10 percent cobbles. It is neutral to moderately alkaline.

McFaul series

The McFaul series consists of deep, well drained soils in slightly convex areas on alluvial fans. These soils formed in sandy alluvium primarily from granite and smaller amounts of sandstone, basalt, and rhyolite. Slope ranges from 2 to 8 percent. The average annual precipitation is 8 to 10 inches, and the average annual air temperature is 49 to 51 degrees F.

McFaul soils are similar to Greenbrae and Prey soils. They are near Aldax, Indiano, and Prey soils. Greenbrae soils have a B2t horizon that is clay loam, sandy clay loam, or sandy clay and averages 27 to 35 percent clay. Prey soils have a hardpan at a moderate depth. Aldax soils are shallow. Indiano soils are moderately deep.

Typical pedon of McFaul sand, 2 to 8 percent slopes, 7 miles south of Carson City, about 1,300 feet north and 400 feet west of the southeast corner of sec. 9, T. 14 N., R. 20 E.:

A11—0 to 3 inches; pale brown (10YR 6/3) sand, dark grayish brown (10YR 4/2) moist; single grained; loose when dry or moist, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly acid; abrupt smooth boundary.

A12—3 to 11 inches; grayish brown (10YR 5/2) loamy sand, dark brown (10YR 3/3) moist; massive; slighty hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores and common fine tubular pores; neutral; clear smooth boundary.

B1t—11 to 16 inches; grayish brown (10YR 5/2) gravelly sandy loam, brown (10YR 4/3) moist; massive; very hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; many very fine tubular pores and few fine tubular pores; thin clay films on sand grains; 30 percent gravel; neutral; clear smooth boundary.

B2t—16 to 20 inches; brown (10YR 5/3) gravelly sandy clay loam, brown (10YR 4/3) moist; massive; very hard, firm, sticky and plastic; common very fine and fine roots; many very fine tubular pores and common fine tubular pores; thin clay films on some sand grains; clay bridges and thin continuous films in pores; 25 percent gravel; slightly acid; clear wavy boundary.

B3t—20 to 28 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine interstitial pores; thin patchy clay films on sand grains and clay bridges; 10 percent gravel; slightly acid; clear wavy boundary.

C1—28 to 34 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; few clay bridges; 5 percent gravel and cobbles; slightly acid; clear wavy boundary.

C2—34 to 52 inches; pale brown (10YR 6/3) sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 5 percent gravel and cobbles; slightly acid; clear wavy boundary.

IIB1—52 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, brown (10YR 4/3) moist; massive; very hard, friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; thin patchy clay bridges; 2 percent gravel and cobbles; neutral.

The solum ranges from 18 to 36 inches in thickness. The A1 horizon ranges from 5 to 12 inches in thickness. It has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It averages less than 1 percent organic matter. An A3 or B21t horizon is common in some pedons. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, chroma of 3 or 4, and hue of 10YR or 7.5YR. It is sandy clay loam, loam, or clay loam and is as much as 35 percent gravel. It averages 18 to 27 percent clay. The C horizon is sand or loamy sand. Unconformable calcareous lacustrine material occurs in some pedons at a depth of more than 40 inches.

Mottsville series

The Mottsville series consists of deep, excessively drained soils on alluvial fans and uplands. These soils formed in alluvium from granitic rock. Slope ranges from 2 to 50 percent. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 48 to 51 degrees F.

Mottsville soils are similar to Cagwin, Corbett, Incy, Glenbrook, Surprise, and Toll soils. They are near Glenbrook, Incy, Surprise, Sutro Variant, and Toll soils. Cagwin and Corbett soils are moderately deep. Incy and Toll

soils have a light-colored surface layer. Surprise soils have gravelly and very gravelly sandy loam B and C horizons. Glenbrook soils are shallow.

Typical pedon of Mottsville loamy coarse sand, 2 to 4 percent slopes, 4 miles south of Carson City, about 50 feet south and 1,000 feet west of the northeast corner of sec. 6, T. 14 N., R. 20 E.:

A11—0 to 5 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark brown (10YR 2/2) moist; single grained; loose dry or moist; common very fine roots; many very fine interstitial pores; slightly acid; clear smooth boundary.

A12—5 to 24 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark brown (10YR 2/2) moist; single grained; loose dry or moist; common very fine roots; many fine interstitial pores; slightly acid; clear wavy boundary.

C1—24 to 30 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many fine interstitial pores; slightly acid; clear wavy boundary.

C2—30 to 60 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many very fine interstitial pores; neutral.

The profile is sand, loamy coarse sand, or loamy sand throughout. It is 5 to 30 percent rock fragments. The A horizon has value of 4 or 5 when dry and 2 or 3 moist and has chroma of 2 or 3. It is 1 to 3 percent organic matter. The C horizon has value of 4 to 6 when dry and 3 to 5 when moist and has chroma of 2 to 4.

Nosrac series

The Nosrac series consists of deep, well drained soils on north-facing mountainsides. These soils formed in material weathered from andesite and schist. Slope ranges from 30 to 50 percent. The average annual precipitation is about 12 to 16 inches, and the average annual air temperature is 45 to 48 degrees F.

Nosrac soils are similar to Oppio, Sutro, and Xerta soils. They are near Cagle, Hocar, and Koontz soils. Oppio soils are moderately deep and have a clayey B horizon. Sutro soils are moderately deep and are gravelly loam between a depth of 10 inches and bedrock. Xerta and Cagle soils are moderately deep and have a clayey B2t horizon. Hocar soils are shallow over bedrock and are calcareous. Koontz soils are shallow over bedrock.

Typical pedon of a Nosrac stony clay loam in an area of Oppio-Nosrac association, 10 miles southeast of Carson City, about 0.3 mile west and 0.1 mile south of northeast corner of sec. 2, T. 14 N., R. 21 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) stony loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; 20 percent gravel; slightly acid; abrupt smooth boundary.

A12—2 to 9 inches; grayish brown (10YR 5/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak and moderate coarse subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and plastic; 20 percent gravel; neutral; clear smooth boundary.

B21t—9 to 18 inches; brown (10YR 5/3) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse angular blocky structure; hard, friable, sticky and plastic; common thin clay films on faces of peds; 40 percent gravel; neutral; clear wavy boundary.

B22t—18 to 34 inches; brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; common thin clay films in pores; 40 percent gravel and 5 percent stones; neutral; clear irregular boundary.

B3t—34 to 60 inches; olive (5Y 5/4) very gravelly loam, olive (5Y 4/3) moist; partially weathered gravel-sized rock fragments that are dark yellowish brown (10YR 3/4), dark gray (10YR 4/1), light gray (7.5YR 7/0), and light red (2.5YR 6/6); massive; hard, firm, sticky and plastic; common thin clay films coating sand grains; 25 percent gravel, 10 percent cobbles, and 5 percent stones; neutral.

The solum is more than 50 inches thick. Bedrock is at a depth of 60 inches or more. The B horizon is 35 to 60 percent rock fragments; it is about 30 to 50 percent gravel and 5 to 15 percent cobbles. The A horizon is 1 to 15 percent stones. The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist and has chroma of 1 to 3. The B2t horizon has value of 4 or 5 when dry and has chroma of 2 to 4. A C horizon occurs in some pedons.

Old Camp series

The Old Camp series consists of shallow, well drained soils on uplands, hills, and low mountains. These soils formed in residuum from basalt and andesite. Slope ranges from 8 to 50 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is about 48 to 50 degrees F.

Old Camp soils are similar to Aldax, Koontz, and Xerta soils. They are near Holbrook Variant, Oppio, Tarloc, and Xerta soils. Aldax soils are stony fine sandy loam. Koontz soils have weathered bedrock at a depth of 8 to 20 inches. Oppio and Xerta soils have a clay B2t horizon. Tarloc soils have a sandy loam B2t horizon.

Typical pedon of an Old Camp very stony loam in an area of Old Camp-Holbrook Variant association, 3 miles north and 1 mile east of Carson City, about 0.4 mile west and 0.1 mile south of the northeast corner of sec. 29, T. 16 N., R. 20 E.:

A1—0 to 3 inches; light brownish gray (10YR 6/2) very stony loam, very dark grayish brown (10YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; 50 percent gravel; mildly alkaline; abrupt smooth boundary.

B1—3 to 5 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; fine medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; few thin clay films on ped faces; 40 percent gravel; mildly alkaline; abrupt wavy boundary.

B2t—5 to 11 inches; pinkish gray (7.5YR 6/2) very stony clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots; many very fine pores and few fine and medium pores; common thin clay films on ped faces and few thin clay films bridging sand grains and in pores; about 15 percent stones; mildly alkaline; abrupt irregular boundary.

R—11 to 17 inches; creviced andesitic bedrock; reddish brown (2.5YR 5/4) clay in the crevices of some pedons.

The thickness of the solum and the depth to bedrock are 10 to 20 inches. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is 40 to 65 percent gravel. The B horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 2 to 4, and hue of 10YR and 7.5YR. It is 40 to 75 percent gravel and about 15 percent stones. It is clay loam, sandy clay loam, or loam.

Old Camp soils in this survey area do not have a Cca horizon and are therefore outside the range defined for

the Old Camp series. This difference, however, does not significantly affect their use and management.

Oppio series

The Oppio series consists of moderately deep, well drained soils on hilly uplands. These soils formed in residuum from andesitic rock. Slope ranges from 15 to 50 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 48 to 50 degrees F.

Oppio soils are similar to Cagle, Deven, and Xerta soils. They are near Nosrac and Old Camp soils. Cagle soils have weathered bedrock at a moderate depth. Deven and Old Camp soils are shallow to bedrock. Nosrac soils have a clay loam B2t horizon. Xerta soils have a hardpan that is underlain by bedrock.

Typical pedon of an Oppio very stony fine sandy loam in an area of Oppio-Nosrac association, 8 miles east of Carson City, about 0.1 mile west and 0.3 mile north of the southeast corner of sec. 11, T. 15 N., R. 21 E.:

A1—0 to 6 inches; light brownish gray (10YR 6/2) very stony fine sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores; 10 to 25 percent stones and 30 percent gravel; mildly alkaline; clear wavy boundary.

B21t—6 to 14 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots and few medium roots; common very fine tubular pores; common thin clay films on ped faces and bridging sand grains; 55 percent gravel; mildly alkaline; abrupt wavy boundary.

B22t—14 to 27 inches; brown (10YR 4/3) gravelly clay, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine roots and common fine and medium roots; common very fine tubular pores; many thin clay films on ped faces; 30 percent gravel; mildly alkaline; abrupt irregular boundary.

R—27 inches; highly fractured andesitic bedrock that has clay material in fractures.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is fine sandy loam or loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 3 or 4. It is clay loam or clay.

Oppio soils in this survey area have slightly more gravel than is defined in the range for the Oppio series. This difference, however, does not significantly affect their use and management.

Orizaba series

The Orizaba series consists of deep, somewhat poorly drained soils on flood plains. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 10 inches, and the average annual air temperature is 48 to 51 degrees F.

Orizaba soils are similar to and are near Bishop, Cradlebaugh, Kimmerling, Jubilee, and Voltaire soils. Bishop, Kimmerling, and Voltaire soils have a dark colored surface layer. Cradlebaugh soils have discontinuous, weak silica cementation. Jubilee soils have a dark colored surface layer and are noncalcareous.

Typical pedon of Orizaba loam, saline-alkali, 1 mile east of Carson City, about 2,300 feet west and 1,300 feet north of the southeast corner of sec. 16, T. 15 N., R. 20 E.:

A1—0 to 16 inches; very pale brown (10YR 7/3) loam, brown (10YR 4/3) moist; strong very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; violently effervescent; strongly alkaline; abrupt smooth boundary.

C1—16 to 24 inches; light gray (10YR 7/2) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; violently effervescent; strongly alkaline; abrupt smooth boundary.

C2—24 to 50 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; common fine and medium dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; massive; hard, friable, sticky and plastic; violently effervescent; strongly alkaline; abrupt smooth boundary.

C3—50 to 60 inches; very pale brown (10YR 7/3) coarse sandy clay loam, pale brown (10YR 6/3) moist; common fine reddish brown (5YR 5/4) and light reddish brown (5YR 6/4) mottles; massive; hard, friable, sticky and plastic; violently effervescent; many large soft lime masses; strongly alkaline.

The profile has hue of 10YR, 2.5Y, or 5Y; value of 6 or 7 when dry and 4 to 6 when moist; and chroma of 2 to 4. The A horizon has electrical conductivity of 10 to 20 millimhos and has 15 to 30 percent exchangeable sodium. The C horizon is stratified sandy loam, sandy clay loam, coarse sandy clay loam, and loam.

Prey series

The Prey series consists of moderately deep, well drained soils on alluvial fans. These soils formed in alluvium mainly from granitic rock. Slope ranges from 0 to 15 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Prey soils are similar to Greenbrae and McFaul soils. They are near Haybourne, Hocar, Incy, Toll, and Ursine Variant soils. Greenbrae and McFaul soils do not have a cemented hardpan. Haybourne soils have a sandy loam B2 horizon that is calcareous. Hocar soils are shallow and have a very gravelly loam C1 horizon that is calcareous. Incy and Toll soils are sandy throughout.

Typical pedon of Prey gravelly loamy sand, 0 to 4 percent slopes, 3.5 miles south of Carson City, about 1,000 feet north of the center of sec. 5, T. 14 N., R. 20 E.:

A11—0 to 2 inches; light gray (10YR 7/2) gravelly sand, dark grayish brown (10YR 4/2) moist; single grained; many very fine roots; many very fine interstitial pores; 15 percent gravel; slightly acid; abrupt smooth boundary.

A12—2 to 5 inches; grayish brown (10YR 5/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common fine roots and few medium roots; many very fine tubular pores, common fine tubular pores, and many very fine and fine interstitial pores; 15 percent gravel; slightly acid; abrupt wavy boundary.

A13—5 to 13 inches; grayish brown (10YR 5/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine and medium roots; many very fine and fine interstitial pores; 15 percent gravel; slightly acid; clear wavy boundary.

B1t—13 to 16 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots and few

fine roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 15 percent gravel; common thin clay films bridging mineral grains; slightly acid; clear smooth boundary.

B21t—16 to 20 inches; yellowish brown (10YR 5/4) coarse sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 10 percent gravel; many thin clay films bridging mineral grains; slightly acid; clear smooth boundary.

B22t—20 to 26 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 15 percent gravel; continuous thin clay films coating and bridging mineral grains; slightly acid; abrupt irregular boundary.

B3t—26 to 30 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 15 percent gravel; few moderately thick clay films bridging mineral grains; neutral; abrupt wavy boundary.

C1sim—30 to 35 inches; very pale brown (10YR 7/3) strongly cemented duripan, dark brown (10YR 4/3) moist; massive; hard, very firm, brittle; few very fine and fine roots between many extremely hard discontinuous silica laminae 1/32 to 1/8 inch thick; mildly alkaline; clear smooth boundary.

C2si—35 to 52 inches; light gray (10YR 7/2) loamy coarse sand, brown (10YR 5/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine and fine tubular pores; 10 percent gravel; weakly silica cemented; mildly alkaline; clear smooth boundary.

C3—52 to 60 inches; very pale brown (10YR 7/3) loamy coarse sand, brown (10YR 5/3) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine and fine interstitial pores; 10 percent gravel; mildly alkaline.

The thickness of the solum and the depth to the strongly cemented duripan are 26 to 38 inches. The A1 horizon has value of 5 to 7 when dry and 3 or 4 when moist; only the A11 horizon has value of 7. The B horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 3 or 4. It is coarse sandy loam, sandy loam, or fine sandy loam that is 10 to 18 percent clay and 5 to 25 percent gravel. It has weak, coarse, prismatic structure or medium, subangular blocky structure, or it is massive. The C1sim horizon has few to many silica laminae. The C horizon is neutral to mildly alkaline. The part of the C horizon below the hardpan is loamy coarse sand to very gravelly loamy sand and is 10 to 70 percent gravel.

Reno series

The Reno series consists of moderately deep, well drained soils on alluvial fans. These soils formed in alluvium from basaltic rock. Slope ranges from 0 to 8 percent. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 49 to 50 degrees F.

Reno soils are similar to Dalzell, Deven, Koontz, Surprise, and Xerta soils. They are near Deven, Koontz, and Surprise soils. Dalzell soils are wet and have strong cementation at a depth of 21 inches. Deven and Koontz soils have bedrock at a shallow depth. Surprise soils are deep and are sandy loam throughout the profile. Xerta soils are moderately deep over bedrock.

Typical pedon of Reno cobbly fine sandy loam, 4 to 8 percent slopes, 8 miles southeast of Carson City, about 0.2 mile north and 0.1 mile east of the southwest corner of sec. 10, T. 14 N., R. 21 E.:

A1—0 to 2 inches; grayish brown (10YR 5/2) cobbly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 10 to 15 percent cobbles; neutral; abrupt smooth boundary.

A2—2 to 3 inches; light brownish gray (10YR 6/2) fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

B1t—3 to 6 inches; dark brown (7.5YR 4/2) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine, fine, and medium roots; common very fine tubular pores; few thin clay films in pores and bridging sand grains; neutral; abrupt smooth boundary.

B21t—6 to 17 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 4/3) moist; strong medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine and fine roots; few fine tubular pores; many thin clay films on ped faces and in pores; few slickensides; neutral; abrupt wavy boundary.

B3t—17 to 21 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 4/3) moist; strong coarse platy structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; many thin clay films on ped faces; neutral; abrupt smooth boundary.

C1—21 to 24 inches; light gray (10YR 7/2) fine sandy loam, dark yellowish brown (10YR 4/4) moist; strong coarse platy structure; hard, firm, nonsticky and nonplastic; few very fine roots; neutral; very abrupt smooth boundary.

C2sicam—24 to 29 inches; light gray (10YR 7/2) strongly cemented duripan; massive; very hard, few very fine, fine, and medium roots; strongly calcareous on ped faces; moderately alkaline; abrupt smooth boundary.

C3—29 to 60 inches; light brownish gray (10YR 6/2) stratified gravelly and very gravelly sandy loam and loamy sand, dark brown (10YR 4/3) moist; massive; slighty hard, very friable, nonsticky and nonplastic; lime coating some gravel; moderately alkaline.

The solum ranges from 20 to 36 inches in thickness. Depth to the hardpan ranges from 20 to 40 inches. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It has platy, subangular blocky structure, or it is single grained or massive. The B2 horizon has hue of 10YR and 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. This horizon has prismatic structure that parts to angular and subangular blocky structure. The duripan is strongly cemented and consists of very thin to thick platelets. It is calcareous in some pedons.

Rock outcrop

Rock outcrop consists mainly of exposures of bare bedrock, but in places a few inches of soil material covers the rock. It generally is barren or supports only a sparse stand of scrubby plants. Areas of Rock outcrop are generally small and are scattered throughout areas of mapped soils. Rock outcrop is mapped in this survey area only in complexes with soils.

Rubble land

Rubble land consists of barren, steep to very steep areas on mountainsides and escarpments that are strewn with boulders and stones. It occurs throughout the mountainous uplands and volcanic plateaus in the survey area. Vegetation occurs only in very small, scattered areas.

Sagouspe series

The Sagouspe series consists of deep, somewhat poorly drained soils on recent flood plains and low stream terraces. These soils formed in sandy alluvium from mixed rock. Slope ranges from 0 to 2 percent. The mean annual precipitation is about 10 inches, and the mean annual air temperature is 49 to 51 degrees F.

Sagouspe soils are similar to Haybourne, Incy, Jubilee, and Toll soils. Sagouspe soils are near Haybourne soils. Incy and Toll soils are excessively drained. Haybourne soils are well drained or somewhat excessively drained and have a coarse sandy loam, sandy loam, sandy clay loam, or fine sandy loam B horizon. Jubilee soils are poorly drained and do not have a Cca horizon.

Typical pedon of Sagouspe sand, 3 miles east of Carson City, about 0.4 mile west and 0.4 mile south of the northeast corner of sec. 14, T. 15 N., R. 20 E.:

C1—0 to 4 inches; light brownish gray (10YR 6/2) sand, dark grayish brown (10YR 4/2) moist; single grained; loose; common very fine and fine roots; many very fine interstitial pores; moderately alkaline; abrupt smooth boundary.

C2—4 to 10 inches; light gray (10YR 7/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; many very fine and fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

A1b—10 to 24 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; common dark yellowish brown (10YR 4/4) and dark reddish brown (5YR 3/2) moist mottles; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; neutral; abrupt smooth boundary.

C3—24 to 60 inches; light gray (10YR 7/2) sand, dark grayish brown (10YR 4/2) moist; common fine and medium dark reddish brown (5YR 3/2) and reddish brown (5YR 4/3) mottles; single grained; loose; few fine and medium roots; many very fine interstitial pores; neutral.

The profile is saturated at a depth of less than 36 inches in spring and summer. It has hue of 10YR or 2.5Y value of 4 or 7 when dry and 3 or 4 when moist, and chroma of 1 to 3. The part between depths of 10 and 40 inches averages sand and includes sand, loamy sand, and loamy fine sand. The latter are stratified with admixtures of loam and clay loam that are generally discontinuous.

Surprise series

The Surprise series consists of deep, well drained soils on alluvial fans. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 15 percent. The mean annual precipitation is 10 to 12 inches, and the mean annual air temperature is about 51 degrees F.

Surprise soils are similar to Haybourne and Mottsville soils. They are near Greenbrae, Incy, Reno, and Toll soils. Haybourne soils have a light-colored surface layer. Mottsville soils are coarse textured throughout the profile. Greenbrae soils have a clay loam, sandy clay loam, or sandy clay B2t horizon. Incy and Toll soils are sandy throughout the profile. Reno soils have a clay, sandy clay loam, or sandy clay B2t horizon and a hardpan.

Typical pedon of Surprise gravelly sandy loam, 0 to 2 percent slopes, 2 miles south of Carson City, about 0.25 mile east and 0.2 mile north of the southwest corner of sec. 29, T. 15 N., R. 20 E.:

A11—0 to 7 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots and common very fine roots; common very fine tubular pores; 10 percent fine gravel; neutral; abrupt smooth boundary.

B2—7 to 26 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few medium roots and common very fine roots; common very fine tubular pores; 20 percent fine gravel; neutral; clear smooth boundary.

C1—26 to 40 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; 20 percent fine gravel; neutral; clear smooth boundary.

C2—40 to 60 inches; pale brown (10YR 6/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 20 percent gravel; neutral.

The solum ranges from 23 to 38 inches in thickness. The A horizon ranges from 7 to 14 inches in thickness. The A1 horizon has hue of 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It has weak, subangular blocky structure, or it is massive. The B2 and C horizons have hue of 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. They have weak subangular blocky structure, or they are massive. They are mainly gravelly sandy loam, but in some pedons they have strata of gravelly loamy sand, sandy loam, loam, or sand below a depth of 40 inches. The B2 and C horizons are 15 to 35 percent coarse fragments, mainly fine gravel.

Sutro series

The Sutro series consists of moderately deep, well drained soils on uplands or low mountains. These soils formed in residuum from weathered metavolcanic rock. Slope ranges from 15 to 50 percent. The average annual precipitation is about 10 to 14 inches, and the average annual air temperature is 47 to 51 degrees F.

Sutro soils are similar to Holbrook Variant, Nosrac, and Sutro Variant soils. They are near Cagle, Hocar, and Koontz soils. Holbrook Variant soils are moderately deep and have a very gravelly B2 horizon. Nosrac soils are deep and have a very gravelly clay loam B22t horizon. Cagle soils have a gravelly clay B22t horizon. Hocar soils are shallow, do not have a B horizon, and are calcareous. Koontz soils are shallow and have a very gravelly clay loam B2t horizon. Sutro Variant soils are deep.

Typical pedon of a Sutro very stony loam in an area of Koontz-Sutro complex, 30 to 50 percent slopes, 8 miles east and 4 miles south of Carson City, about 500 feet south and 1,500 feet west of the northeast corner of sec. 34, T. 15 N., R. 21 E.:

A11—0 to 2 inches; brown (10YR 5/3) very stony loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine and medium tubular pores; 5 percent stones and 20 percent gravel; neutral; abrupt smooth boundary.

A12—2 to 6 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine and medium tubular pores; 20 percent gravel; neutral; abrupt smooth boundary.

B2—6 to 14 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; weak coarse and very coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots and common medium and coarse roots; common fine

and medium tubular pores; 25 percent gravel; neutral; abrupt smooth boundary.

C1—14 to 24 inches; brownish yellow (10YR 6/6) gravelly loam, dark yellowish brown (10YR 4/4) unrubbed and yellowish brown (10YR 5/4) rubbed moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common fine and medium tubular pores; 30 percent gravel; neutral; clear wavy boundary.

C2r—24 to 48 inches; weathered metavolcanic rock.

The solum ranges from 12 to 19 inches in thickness. Weathered bedrock is at a depth of 20 to 40 inches. The A horizon is 6 to 10 inches thick. The part of the profile between a depth of 10 inches and weathered bedrock is gravelly loam that is 15 to 35 percent rock fragments and more than 18 percent clay. The A horizon has value of 4 or 5 when dry and 2 or 3 when moist and has chroma of 2 or 3. It is 15 to 30 percent gravel and 5 to 10 percent cobbles. The B2 horizon commonly is loam but is light clay loam in some pedons. It is about 10 to 20 percent gravel and 5 to 15 percent cobbles. This horizon has value of 4 or 5 when dry and 3 or 4 when moist and has chroma of 2 to 4. The C horizon is loam or very fine sandy loam in some pedons. It is about 5 to 20 percent gravel and cobbles. This horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 3 or 4.

Sutro Variant

The Sutro Variant consists of deep, well drained soils on uplands. These soils formed in colluvium from weathered metavolcanic rock. Slope ranges from 15 to 75 percent. The average annual precipitation is about 12 to 14 inches, and the average annual air temperature is 48 to 50 degrees F.

Sutro Variant soils are similar to Cagwin, Holbrook, Sutro, and Vicee soils. They are near Glenbrook and Mottsville soils. Cagwin soils are moderately deep and sandy. Holbrook soils have a very gravelly sandy loam C horizon. Vicee soils do not have a B horizon. Sutro soils are moderately deep and have a loam or clay loam B2 horizon. Glenbrook soils are shallow and do not have a B horizon. Mottsville soils are sandy and deep.

Typical pedon of a Sutro Variant very stony loam in an area of Koontz-Sutro Variant association, steep, 1 mile west and 1 mile south of Carson City, about 0.4 mile west of the east quarter-corner of sec. 24, T. 15 N., R. 19 E.:

A11—0 to 2 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores and many very fine tubular pores; neutral; abrupt smooth boundary.

A12—2 to 9 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; few very fine tubular pores and many very fine interstitial pores; neutral; clear smooth boundary.

B2—9 to 25 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots and common medium roots; few very fine tubular pores and many very fine interstitial pores; neutral; clear smooth boundary.

C1—25 to 51 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine tubular pores and many very fine interstitial pores; neutral; abrupt irregular boundary.

C2r—51 to 58 inches; metavolcanic bedrock.

Weathered bedrock is at a depth of 40 inches to more than 60 inches. The solum is 15 to 30 inches thick. Any one horizon is 5 to 30 percent coarse fragments, mainly gravel. The profile is slightly acid or neutral. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 3 when moist, and chroma of 1 to 3. It is very stony very fine sandy loam or loam. The B2 and C horizons have hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. They are loam or very fine sandy loam.

Tarloc series

The Tarloc series consists of moderately deep, well drained soils on uplands or low hills. These soils formed in residuum mainly from granitic rock. Slope ranges from 4 to 50 percent. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 48 to 51 degrees F.

Tarloc soils are similar to Indiano Variant and Tarloc Variant soils. They are near Glenbrook, Oppio, and Toiyabe soils. Tarloc Variant soils are colder than Tarloc soils. Indiano Variant soils have a B horizon of fine sandy loam, sandy clay loam, or clay loam. Glenbrook soils are shallow. Oppio soils have a clay or sandy clay B2t horizon. Toiyabe soils are shallow, are colder, and have a sandy C horizon.

Typical pedon of a Tarloc gravelly coarse sandy loam in an area of Tarloc-Glenbrook association, 2 miles north of Carson City, near the center of sec. 31, T. 16 N., R. 20 E.:

A11—0 to 3 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 25 percent fine gravel; neutral; clear smooth boundary.

A12—3 to 8 inches; grayish brown (10YR 5/2) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots and few fine and medium roots; common very fine tubular pores, few fine tubular pores, and many very fine interstitial pores; 25 percent fine gravel; neutral; abrupt smooth boundary.

B2t—8 to 22 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial pores, few fine and medium interstitial pores, and many very fine interstitial pores; common thin clay films coating sand grains and in pores; 25 percent gravel; neutral; abrupt irregular boundary.

Cr—22 to 25 inches; pale brown (10YR 6/3) weathered granitic rock; can be dug with hand tools; few roots in weathered material along cracks and in seams.

The thickness of the solum and the depth to weathered bedrock are 20 to 40 inches. The profile has hue that is dominantly 10YR but is 7.5YR in some pedons. The A1 horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is 15 to 30 percent fine gravel. The B2t horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 to 4. It is dominantly gravelly coarse sandy loam, but in some pedons it is sandy loam and is less than 18 percent clay. It is 20 to 30 percent fine gravel.

Tarloc Variant

The Tarloc Variant consists of moderately deep, well drained soils on mountains. These soils formed in material derived from weathered granitic rock. Slope ranges from 2 to 8 percent. The average annual precipitation is about 20 to 35 inches, and the average annual air temperature ranges from about 42 to 47 degrees F.

Tarloc Variant soils are similar to Tarloc soils. They are near Cagwin, Corbett, Glenbrook, and Toiyabe soils. Tarloc soils are warmer. Cagwin and Corbett soils are sandy. Glenbrook and Toiyabe soils are shallow.

Typical pedon of Tarloc Variant coarse sandy loam, 2 to 8 percent slopes, 3 miles south and 4 miles west of Carson City, about 0.4 mile west and 0.5 mile north of the southeast corner of sec. 34, T. 15 N., R. 19 E.:

A11—0 to 4 inches; light brownish gray (10YR 6/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

A12—4 to 13 inches; brown (10YR 5/3) coarse sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

B1—13 to 17 inches; brown (10YR 5/3) coarse sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.

B2t—17 to 26 inches; brown (7.5YR 5/4) gravelly coarse sandy loam, dark brown (7.5YR 4/4) moist; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; common thin clay films bridging sand grains and coating pores; 40 percent fine gravel; neutral; clear smooth boundary.

B3t—26 to 32 inches; light brown (7.5YR 6/4) very gravelly coarse sandy loam, brown (7.5YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; many fine interstitial pores; common thin clay films bridging sand grains; 50 percent fine gravel; neutral; clear irregular boundary.

Cr—32 to 34 inches; gray and white, weathered granitic bedrock.

Depth to weathered bedrock ranges from 20 to 40 inches. Some pedons have an O1 horizon 3 inches thick. The A1 horizon has hue of 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. The B horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. It is heavy sandy loam and is 10 to 18 percent clay. The B horizon is 35 to 50 percent coarse fragments, commonly fine gravel.

Toem series

The Toem series consists of shallow, excessively drained soils on mountains. These soils formed in residuum from granitic bedrock. Slope ranges from 30 to 75 percent. The average annual precipitation, which occurs mostly as snow, is 35 to 45 inches. The average annual air temperature is about 40 degrees F.

Toem soils are similar to Aldax Variant, Glenbrook, and Toiyabe soils. They are near Arkson, Cagwin, Corbett, and Vicee soils. Aldax Variant and Arkson soils are very fine sandy loam. Glenbrook and Toiyabe soils are warmer than Toem soils. Cagwin and Corbett soils are moderately deep over bedrock. Vicee soils are deep.

Typical pedon of a Toem bouldery coarse sand in an area of Toem-Rock outcrop complex, 30 to 50 percent slopes, 5 miles west of Carson City, about 0.4 mile south and 0.5 mile west of the northeast corner of sec. 17, T. 15 N., R. 19 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) bouldery coarse sand, very dark grayish brown (10YR 3/2) moist; single grained; loose dry or moist; many very fine roots; many very fine and fine interstitial pores; about 30 percent fine gravel and few large boulders on the surface; slightly acid; clear smooth boundary.

A12—2 to 7 inches; brown (10YR 5/3) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; few coarse roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid; clear smooth boundary.

C1—7 to 17 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark brown (10YR 3/3) moist; massive; soft, very friable; many very fine roots and few fine, medium, and coarse roots; many very fine and fine interstitial pores; 30 percent gravel; slightly acid; abrupt irregular boundary.

Cr—17 to 24 inches; weathered granitic rock.

Depth to weathered granitic rock is 8 to 20 inches. Some pedons have an 0 horizon less than 3 inches thick. The A horizon has value of 4 or 5 when dry and 2 or 3 when moist. The C horizon has hue of 10YR or 2.5Y, value of 3 to 5 when moist, and chroma of 2 or 3. It is loamy coarse sand or coarse sand and has 10 to 35 percent gravel.

Toiyabe series

The Toiyabe series consists of shallow, excessively drained soils on mountainsides. These soils formed in residuum from granitic bedrock. Slope ranges from 30 to 75 percent. The average annual precipitation ranges from about 25 to 35 inches, and the mean annual air temperature ranges from 42 to 45 degrees F.

Toiyabe soils are similar to Aldax, Aldax Variant, Glenbrook, and Toem soils. They are near Arkson, Cagwin, Corbett, Tarloc, Tarloc Variant, and Vicee soils. Aldax soils have a very stony fine sandy loam A1 horizon. Aldax Variant soils have very fine sandy loam A and B horizons. Glenbrook soils are warmer than Toiyabe soils. Tarloc and Tarloc Variant soils are moderately deep over bedrock and have a sandy loam C horizon. Arkson and Vicee soils are deep. Cagwin and Corbett soils are moderately deep over bedrock.

Typical pedon of a Toiyabe stony loamy coarse sand in an area of Toiyabe-Corbett complex, 30 to 50 percent slopes, 3 miles west and 2 miles south of Carson City, about 0.1 mile east and about 0.25 mile south of the northwest corner of sec. 27, T. 15 N., R. 19 E.:

A11—0 to 1 inch; white (10YR 8/1) stony loamy coarse sand, gray (10YR 6/1) moist; single grained; loose dry or moist; many fine interstitial pores; 3 percent stones and 55 percent gravel; slightly acid; abrupt smooth boundary.

A12—1 to 4 inches; gray (10YR 5/1) gravelly loamy coarse sand, very dark gray (10YR 3/1) moist; massive; soft, very friable; common very fine roots; many very fine interstitial pores; 30 percent gravel; slightly acid; clear smooth boundary.

C1—4 to 11 inches; gray (10YR 6/1) gravelly coarse sand, dark gray (10YR 4/1) moist; massive; soft, very friable; common very fine and fine roots and few medium roots; many fine interstitial pores; 30 percent gravel; slightly acid; gradual irregular boundary.

C2r—11 to 22 inches; gray and white weathered granitic bedrock.

Some pedons have an 0 horizon about 3 inches thick. Depth to weathered granitic bedrock ranges from about 10 to 20 inches, and the weathered part of the bedrock ranges from 6 inches to more than 30 inches in thickness. The profile is dominantly loamy coarse sand but in places is coarse sand. These textures are modified by gravel, cobbles, or stones. The coarse fragments make up less than 35 percent of the profile. The A horizon generally has value of 4 or 5 when dry and 2 or 3 when moist and has chroma of 1 to 3, but in some pedons the upper 1 inch or 2 inches has value of as much as 8. The C horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 3 or 4 when moist, and chroma of 1 to 3.

Toll series

The Toll series consists of deep, somewhat excessively drained soils on alluvial fans and terraces. These soils formed in alluvium mainly from granitic rock. Slope ranges from 0 to 15 percent. The average annual precipitation is 8 to 12 inches, and the average annual air temperature is 49 to 51 degrees F.

Toll soils are similar to Incy and Mottsville soils. They are near Aldax, Indiano, Mottsville, and Prey soils. Incy soils have fine sand between depths of 10 and 40 inches. Mottsville soils are sand or loamy sand throughout the profile. Aldax soils are shallow over bedrock. Indiano soils have a clay loam or sandy clay loam B2t horizon. Prey soils are strongly cemented between depths of 26 and 38 inches.

Typical pedon of Toll gravelly loamy sand, 0 to 15 percent slopes, 3 miles south and 1 mile east of Carson City, about 0.25 mile west and 0.1 mile south of the northeast corner of sec. 4, T. 14 N., R. 20 E.:

A11—0 to 2 inches; light brownish gray (10YR 6/2) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; many very fine interstitial pores; about 20 percent gravel; neutral; abrupt smooth boundary.

A12—2 to 15 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; many very fine interstitial pores; 20 percent gravel; neutral; clear smooth boundary.

C1—15 to 60 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 20 percent gravel; neutral.

The A horizon has hue of 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. It is loamy sand, sand, or gravelly coarse sand.

Ursine Variant

The Ursine Variant consists of shallow, well drained soils on alluvial fans. These soils formed in alluvium from metasedimentary rock. Slope ranges from 8 to 15 percent. The average annual precipitation is 10 to 12 inches, and the mean annual air temperature is 49 to 51 degrees F.

Ursine Variant soils are similar to Ursine and Vamp soils. They are near Hocar, Incy, and Prey soils. Ursine soils formed in carbonatic material. Vamp soils are somewhat poorly drained. Incy soils are sandy throughout the profile. Prey soils have a sandy loam B horizon and a weakly cemented hardpan. Hocar soils are shallow over bedrock.

Typical pedon of Ursine Variant very gravelly fine sandy loam, 8 to 15 percent slopes, 3 miles east of Carson City, about 0.25 mile south of the northeast corner of sec. 23, T. 15 N., R. 20 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 35 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

A12—2 to 5 inches; light brownish gray (10YR 6/2) gravelly fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine tubular pores; 25 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1ca—5 to 7 inches; light gray (10YR 7/2) very gravelly fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; common very fine tubular pores; 50 percent gravel; violently effervescent; moderately alkaline; abrupt smooth boundary.

C2sicam—7 to 38 inches; white (10YR 8/1) indurated silica-cemented hardpan.

Depth to the hardpan ranges from 5 to 20 inches. The hardpan ranges from 5 inches to more than 40 inches in thickness. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 2 or 3. It is 25 to 40 percent gravel, mainly pan fragments. The C1 horizon has value of 6 to 8 when dry and 5 or 6 when moist and has chroma of 2 or 3. It is 35 to 65 percent gravel.

Vamp series

The Vamp series consists of moderately deep, somewhat poorly drained, saline-alkali affected soils on flood plains and alluvial fans. These soils formed in alluvium from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is about 9 inches, and the average annual air temperature is about 49 to 51 degrees F.

Vamp soils are similar to Fettic Variant and Ursine Variant soils. They are near Dalzell soils. Fettic Variant soils have a clay loam B2t horizon. Ursine Variant soils are shallow over an indurated hardpan. Dalzell soils have a clay loam, light silty clay loam, sandy clay loam, or loam B2t horizon.

Typical pedon of Vamp fine sandy loam, slightly saline-alkali, 1 mile east of Carson City, about 0.2 mile west and 0.35 mile south of the northeast corner of sec. 8, T. 15 N., R. 20 E.:

A1—0 to 4 inches; very pale brown (10YR 7/3) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; violently effervescent; strongly alkaline; clear smooth boundary.

C1—4 to 12 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; violently effervescent; strongly alkaline; clear smooth boundary.

C2—12 to 24 inches; light gray (10YR 7/2) fine sandy loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; violently effervescent; very strongly alkaline; abrupt smooth boundary.

C3sicam—24 to 36 inches; light gray (10YR 7/2) strongly silica cemented hardpan.

C4—36 to 60 inches; white (10YR 8/2) loam, brown (10YR 5/3) moist; many fine and medium grayish brown (10YR 5/2), brown (10YR 4/3), and light yellowish brown (10YR 6/4) mottles; weak medium platy structure; hard, friable, slightly sticky and slightly plastic; violently effervescent; strongly alkaline.

Depth to the strongly silica cemented hardpan ranges from 20 to 40 inches. The profile ranges from moderately alkaline to very strongly alkaline. The part of the profile between a depth of 10 inches and the hardpan is mainly stratified fine sandy loam, loam, silt loam, and very

fine sandy loam, but thin strata of loamy sand, clay loam, and silty clay loam are in some pedons. The average texture is fine sandy loam or loam that is 15 to 18 percent clay. Hue is dominantly 10YR but is 2.5YR in some pedons. The A1 horizon has value of 5 to 7 when dry and 3 to 5 when moist and has chroma of 1 to 3. The C horizon has value of 5 to 8 when dry and 3 to 5 when moist and has chroma of 2 or 3. The strongly cemented hardpan is underlain by highly stratified material that ranges from loamy sand to silt loam.

Vicee series

The Vicee series consists of deep, well drained soils on mountains. These soils formed in residuum and colluvium from metavolcanic rock. Slope ranges from 30 to 75 percent. The average annual precipitation is 20 to 35 inches, and the average annual air temperature is about 40 to 45 degrees F.

Vicee soils are similar to Arkson, Cagwin, and Corbett soils. They are near Cagwin, Aldax Variant, Corbett, Toem, and Toiyabe soils. Arkson soils are at a higher elevation and are colder than Vicee soils. Cagwin and Corbett soils are moderately deep and are sandy. Aldax Variant, Toem, and Toiyabe soils are shallow.

Typical pedon of a Vicee very fine sandy loam in an area of Vicee-Aldax Variant complex, 30 to 50 percent slopes, 3 miles west of Carson City, about 500 feet west and 500 feet north of the southeast corner of sec. 15, T. 15 N., R. 19 E.:

O1—1 inch to 0; pine needles and duff.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular pores; neutral; clear smooth boundary.

A12—3 to 7 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular pores; neutral; clear smooth boundary.

C1—7 to 25 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular pores and few fine tubular pores; neutral; clear smooth boundary.

C2—25 to 46 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots and common medium roots; common very fine tubular pores and few fine tubular pores; neutral; abrupt irregular boundary.

C3r—46 inches; weathered metavolcanic rock.

Depth to weathered metavolcanic bedrock ranges from 40 inches to more than 60 inches. The profile is 10 to 20 percent gravel throughout. It has hue of 10YR or 2.5Y. The A horizon is 7 to 10 inches thick. The A1 horizon has value of 4 or 5 when dry and has chroma of 1 to 3. The C horizon has value of 5 or 6 when dry and 3 or 4 when moist and has chroma of 1 to 3. It commonly is very fine sandy loam, but in some pedons it is loam that is less than 18 percent clay.

Voltaire series

The Voltaire series consists of deep, poorly drained and very poorly drained soils on flood plains. These soils formed in material from mixed rock. Slope ranges from 0 to 2 percent. The average annual precipitation is 10 to 12 inches, and the average annual air temperature is 49 to 50 degrees F.

Voltaire soils are similar to Bishop and Cradlebaugh soils. They are near Histic Haplaquolls and Jubilee, Bishop, and Kimmerling soils. Bishop soils have sandy clay loam, clay loam, loam, or silt loam between depths of 10 and 40 inches. Kimmerling soils average clay loam or silty clay loam between depths of 10 and 40 inches. Cradlebaugh soils have durinodes at a moderate depth in the profile. Histic Haplaquolls have a peat surface layer about 9 inches thick. Jubilee soils are sandy loam or coarse sandy loam that is less than 18 percent clay between depths of 10 and 40 inches.

Typical pedon of Voltaire silty clay loam, saline, 5 miles south and 1 mile east of Carson City, about 0.4 mile east and 0.25 mile north of the southwest corner of sec. 9, T. 14 N., R. 20 E.:

A11—0 to 9 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; strong very fine angular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; many very fine tubular pores; strongly alkaline; clear smooth boundary.

A12—9 to 18 inches; gray (10YR 5/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, sticky and plastic; many very fine and common fine roots; many very fine tubular pores and few fine tubular pores; strongly effervescent; strongly alkaline; clear smooth boundary.

C1—18 to 45 inches; olive gray (5Y 5/2) silty clay loam, very dark gray (5Y 3/1) moist; common fine and medium black (10YR 2/1) mottles and many fine yellowish brown (10YR 5/6) mottles; massive; slightly hard, very friable, sticky and plastic; many very fine roots; many very fine and fine tubular pores; strongly effervescent; strongly alkaline; clear smooth boundary.

C2—45 to 60 inches; gray (5Y 5/1) silty clay loam, dark olive gray (5Y 3/2) moist; many fine and medium dark yellowish brown (10YR 4/4) mottles; massive; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; calcareous; strongly alkaline.

The profile is usually saturated in winter and spring. The water table is at a depth of about 15 to 30 inches. The part of the profile between depths of 10 and 40 inches is silty clay loam or clay loam that is more than 35 percent clay. The A horizon is 10 to 20 inches thick. It has hue of 10YR or 2.5Y, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 or 2. The C horizon has hue of 10YR, 5Y, or 2.5Y; value of 4 or 5 when dry and 3 or 4 when moist; and chroma of 1 to 3. This horizon has distinct or prominent mottles. It is silty clay loam, clay loam, and sandy clay loam and in places has thin strata of sand and clay.

Xerta series

The Xerta series consists of moderately deep, well drained soils on uplands. These soils formed in residuum from basaltic rock. Slope ranges from 4 to 30 percent. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 48 to 51 degrees F.

Xerta soils are similar to Deven, Cagle, and Oppio soils. They are near Old Camp and Tarloc soils. Deven soils are shallow to basalt rock. Cagle soils do not have a hardpan and are moderately deep to weathered bedrock. Oppio soils are moderately deep to andesitic bedrock. Old Camp soils are shallow and have a very stony clay loam B2t horizon. Tarloc soils are moderately deep to weathered bedrock and have a B2t horizon that is mainly coarse sandy loam but is sandy loam in some pedons.

Typical pedon of a Xerta extremely stony loam in an area of Xerta-Rock outcrop complex, 4 to 30 percent

slopes, 3 miles northeast of Carson City, about 1,300 feet west and 200 feet north of the southeast corner of sec. 35, T. 16 N., R. 20 E.:

A11—0 to 2 inches; grayish brown (10YR 5/2) extremely stony fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 35 percent stones; mildly alkaline; abrupt smooth boundary.

A12—2 to 5 inches; brown (10YR 5/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine roots; common very fine tubular pores; 50 percent gravel; mildly alkaline; abrupt smooth boundary.

A3—5 to 10 inches; brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine tubular pores; 30 percent gravel; mildly alkaline; abrupt smooth boundary.

B2t—10 to 21 inches; brown (7.5YR 4/2) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; common very fine tubular pores; common cutans and few slickensides; mildly alkaline; abrupt wavy boundary.

B3tca—21 to 23 inches; dark grayish brown (10YR 4/2) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; 60 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Csicam—23 to 24 inches; white (10YR 8/1) indurated hardpan that has a troweled appearance on top.

R—24 inches; basalt.

The thickness of the solum, the depth to the hardpan, and the depth to bedrock are 20 to 40 inches. The A1 horizon has hue of 10YR, value of 4 to 6 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is neutral or mildly alkaline. The A11 horizon is 35 to 65 percent rock fragments, 15 to 50 percent of which is stones. The A12 and A3 horizons are 15 to 50 percent gravel. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is less than 60 percent clay. It is mildly alkaline or moderately alkaline. The B3t horizon has value of 4 to 6 when dry and 4 or 5 when moist and has chroma of 2 to 4. It is clay loam or loam. It is 35 to 65 percent gravel that is either hardpan fragments or basaltic fragments. The Csicam horizon has continuous silica laminae about 1 inch to 2 inches thick.

Formation of the soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Factors of soil formation

Soil is the collection of natural bodies on the Earth's surface containing living matter and supporting or capable of supporting plants. Soils differ within very short distances. The differences are the result of the interaction of five soil-forming factors. These factors are (1) the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the relief or topography, which influences the local or internal environment of the soil—drainage, moisture content, aeration, susceptibility to erosion, and exposure to sun and wind; (4) the biological forces that act upon the soil material—the plants and animals living on and in it; and (5) the length of time the climate and biological forces have acted on the soil material. The relative effect of each of these factors varies with each soil.

The processes of soil formation are quite complex. In the following paragraphs these relationships as they exist in the Carson City Area are briefly described.

Parent material

Parent material is the weathered rock or unconsolidated material in which soils form. The hardness, grain size, and porosity of the parent material and its content of weatherable minerals greatly influence soil formation. The main sources of parent material in the Carson City Area are (1) granitic rock, principally granodiorite and quartz monzonite, which are exposed in the Carson Range and in the western part of the Virginia Range; (2) metavolcanic and metasedimentary rock, principally metamorphosed andesite breccia, rhyolitic tuff, basalt, rhyolite, shale, slate, and sandstone, which are exposed in the Carson Range, on Prison Hill, and in places in the Virginia and Pine Nut Ranges; (3) volcanic rock, principally basalt, andesite, rhyolite, and rhyolite tuff, which are exposed in the Virginia and Pine Nut Ranges; (4) younger alluvium, principally unconsolidated lenses of gravel, sand, silt, and clay, which make up stream channel and alluvial fan deposits in the part of Eagle Valley along the Carson River and some places on uplands; and (5) older alluvium, principally semiconsolidated to unconsolidated lenses of gravel, sand, silt, and clay, which are exposed largely along the margins of Eagle Valley, along the margins of the flood plains of the Carson River, and in small upland valleys.

The granitic rock is coarse grained and contains a considerable amount of quartz. It weathers to angular coarse sand and fine gravel. The hardness of the rock varies. In areas of differential weathering, soils form where the granitic rock weathers to saprolite, and Rock outcrop is apparent in the areas of hard rock. Cagwin, Corbett, Glenbrook, Toem, Toiyabe, and Tarloc soils formed in saprolite weathered from the granitic rock and are coarse sand, loamy sand, or sandy loam. Mottsville and Incy soils formed in alluvium eroded from granitic rock and have inherited the gritty, sandy texture of this rock.

The metavolcanic and metasedimentary rock is dense, generally is finer textured, and contains a considerable amount of weathered minerals. Soils such as Vicee, Arkson, and Hocar, which formed on young surfaces in saprolite derived from these rocks, have loamy texture and generally contain a considerable amount of gravel, cobbles, and stones. Holbrook soils, which formed in recent alluvium derived from metavolcanic rock, also have a loamy texture and contain a considerable amount of coarse fragments. Koontz soils, which formed in saprolite derived from metavolcanic rock on slightly older surfaces, have a very gravelly clay loam B2t horizon.

The volcanic rock occurs extensively in the Virginia and Pine Nut Ranges. It includes both massive rock and softer tuff. This rock contains a considerable amount of minerals that weather to clay. Cagle, Deven, Oppio, and Xerta soils, which formed in saprolite derived from volcanic rock, have a clay B2t horizon. Nosrac soils formed in similar materials but have a clay loam B2t horizon. The more recent Aldax soils do not have a B2t horizon and are shallow over andesitic bedrock.

Young alluvium is on alluvial fans and flood plains in Eagle Valley and along the Carson River. In places this material has inherited characteristics directly from the parent rock. Mottsville soils, for example, formed in recent alluvium derived from granitic rock. These soils have a loamy coarse sand texture similar to that of upland soils that formed in granitic saprolite. Holbrook soils also formed in alluvium derived from metavolcanic rock. They have the very gravelly loamy texture typical of the upland soils that formed in saprolite weathered from metavolcanic rock.

Recent alluvium forms much of the valley fill in Eagle Valley and on the flood plain of the Carson River. It is derived from mixed rock. Influences of specific kinds of rock are discernible, however, in the recent soils that formed in this material. The gritty texture inherited from granitic rock, for example, is apparent in the Bishop and Sagouspe soils. The sandy Toll soils reflect the influence of both granitic and rhyolitic rock.

The older alluvium makes up some of the older, more stable land surfaces. It is derived from mixed rock but reflects the influence of granitic rock eroded from the Carson Range. This alluvium contains much material weathered from minerals. Soils such as Dalzell, Prey, and Reno have readily discernible horizons and a duripan.

Climate

The climate of Carson City Area is characterized by warm, dry summers and cool, wet winters. A high proportion of the annual precipitation falls as snow in winter. The average annual precipitation ranges from about 8 to 12 inches in Eagle Valley to about 35 to 45 inches at high elevations in the Carson Range. The average annual soil temperature in Eagle Valley is about 49 to 50 degrees F, and the frost-free season is about 100 to 110 days. In the Carson Range the temperature of the soil is as low as about 42 degrees F, and the frost-free season is less than 70 days.

The Carson Range, which is in the western part of the Area, receives most of the precipitation and acts as a barrier to the eastward movement of Pacific storms. As a consequence, the Virginia and Pine Nut Ranges, in the eastern part of the Area, receive only about 15 to 20 inches of precipitation.

Although the total amount of precipitation varies at comparable elevations in the mountain ranges within the Area, the soils in the Area generally receive more precipitation as elevation increases.

At the lowest elevations, 4,600 to 5,000 feet, where precipitation is lowest, the weathering of parent material is slow, leaching is incomplete, and eluviation and illuviation proceed at a minimal rate. The plant cover consists mostly of sagebrush and other shrubs. Typically, the soils are low in organic matter content and have a thin A horizon. Haybourne and McFaul are typical of the well drained soils in the parts of the Area that receive the lowest precipitation.

As the elevation increases, there is an accompanying increase in precipitation. This is reflected by deeper leaching of salts and calcium carbonate, decreasing reaction, changes in kinds of vegetation, and a thickening and darkening of the color of the A horizon. At the higher elevations, where the precipitation exceeds 20 inches, leaching of bases is more intensive and the soils are slightly acid to medium acid. A typical sequence of soils that formed in saprolite derived from granitic rock and that receive greater precipitation as elevation increases is (1) Glenbrook soils, which are at an elevation of 4,800 to 6,500 feet, have a plant cover of sagebrush, grass, and associated shrubs, and receive mean annual precipitation of about 10 to 14 inches; (2) Toiyabe soils, which are at an elevation of 5,400 to 7,000 feet, have a plant cover of Jeffrey pine, snowberry, bitterbrush, sagebrush, and some grass, and receive mean annual precipitation of about 20 to 35 inches; and (3) Toem soils, which are at an elevation of 7,000 to 9,000 feet, have a plant cover of Jeffrey pine, red fir, and western white pine, and receive mean annual precipitation of about 30 to 45 inches.

Biological forces

Vegetation, burrowing animals, insects, earthworms, bacteria, and fungus are important in the formation of soils. Vegetation probably has the greatest influence.

In the poorly drained areas, the dense growth of sedge, grass, and other plants supplies the organic matter that gives Bishop, Cradlebaugh, Kimmerling, and other soils a dark color.

The kinds and amount of vegetation on the soils in the survey area increase considerably as elevation increases. In Eagle Valley and in the drier parts of the Virginia and Pine Nut Ranges, the plants are principally sagebrush, grass, and associated shrubs. Because of the scarcity of available moisture in this area, plants cover a relatively small part of the surface. Plants add minor quantities of organic matter to the soil, give little protection from wind, and provide meager shade. The soils on the alluvial fans and mountain foot slopes have a denser cover of shrubs and grass. They have accumulated more organic matter and have a thicker A horizon.

The soils in the higher areas on mountains have denser stands of plants, mainly trees, shrubs, and grass. Because of the denser vegetation, the A horizon of the soils in these areas is dark colored and, on stable surfaces, is considerably thicker.

Relief

Relief, through its influence on drainage, runoff, and erosion, has an important effect on the formation of the soils in the survey area. Among the physiographic features of the area that control relief to a considerable extent are (1) the mountains that border the area, (2) the alluvial fans that flank the mountain ranges, and (3) the plains in Eagle Valley and along the Carson River.

The Carson Range, in the western part of the area, rises to an altitude of more than 9,000 feet. The area is bordered on the north by the Virginia Range, which rises to an altitude of 7,000 feet. The Pine Nut Range, along the eastern boundary, has an elevation of more than 7,500 feet. Prison Hill, in the south-central part, rises to 5,700 feet. These mountains enclose Eagle Valley, which ranges in elevation from about 4,600 to 4,800 feet.

Eagle Valley slopes eastward, and the streams that have their source in the Carson Range cross it to discharge into Carson River, about 3 miles east of Carson City.

The mountain ranges are mainly characterized by excessive relief. Runoff is rapid to very rapid, and the hazard of erosion is high. The removal of material by erosion slows soil development. Because of erosion, soil development is reflected mainly by a dark A horizon. Aldax, Cagwin, Toem, Corbett, Toiyabe, Glenbrook, Arkson, Vicee, Sutro, and Hocar are examples of soils whose formation has been unable to act on parent material over sufficient periods of time because of the effects of erosion.

In the parts of the Virginia and Pine Nut Ranges and the foothills of the Carson Range that have less relief, runoff is slower and the erosion is less. Soil formation therefore has been able to proceed over a considerable period of time. The soils that formed on these landscapes have a clay loam or clay B2t horizon. Cagle, Deven, Indiano, Koontz, Nosrac, and Oppio are examples of soils in which the factors of soil formation have been able to act on the parent material long enough to form a B2t horizon.

Eagle Valley can be described as a plain bordered by alluvial fans. Erosion in this area is essentially in equilibrium with the rate of soil development. Mottsville, Holbrook, Haybourne, Dalzell, McFaul, Reno, Incy, and Toll soils are typical of Eagle Valley.

The soils on the low, flat flood plains have very slow runoff. These soils have restricted drainage, which results in wetness that causes mottling. The soils support dense stands of meadow vegetation. They have a dark colored A horizon because of the large additions of organic matter to the soil. Some soils that are subject to a high water table contain excessive soluble salts in their upper horizons. Examples of some soils that formed on flood plains are Jubilee, Bishop, Kimmerling, Orizaba, Cradlebaugh, Sagouspe, and Voltaire soils.

Time

The effect of time on the formation of the soils in the Carson City Area is readily apparent. Sequences of flood plains, alluvial fans, and stable upland summits indicate that the soils formed on these landscapes formed over a long span of geologic time.

Flood plains, currently aggrading alluvial fans, and steep upland areas that are subject to rapid erosion form the most recent soil landscapes. The soils on these young surfaces have little or no profile development except for an A horizon. Examples of soils that formed in recent parent material are Jubilee and Bishop soils on flood plains; Holbrook, Mottsville, and Toll soils on alluvial fans; and Cagwin and Toem soils on steep uplands.

The degree of soil development increases from recent to older landscapes. On alluvial fans and stable mountain surfaces, which date back to the close of the Pleistocene Epoch, the soils have developed an A horizon and a cambic B horizon or a weak B2t horizon. Haybourne, Surprise, and Sutro soils, for example, formed on landscapes of this age.

On landscapes that date back to drier periods of the Wisconsin glacial-pluvial interval, the soils have distinct A1 and B2t horizons and in some areas a Csi horizon. The B2t horizon is more strongly expressed, and it ranges in texture from clay loam to light clay. Major soil develpment in these soils probably took place before the Recent Epoch. Deven, Fettic, Greenbrae, and Nosrac soils, for example, are of late Wisconsin age.

Older alluvial fans and terraces and stable upland areas date back to the earlier part of the early Wisconsin stage of the Pleistocene Epoch. Soils on these landscapes have an A1 horizon and a fine textured, prismatic B2t horizon. Some of the soils on these landscapes also developed a silica-cemented hardpan. Among the soils that reflect all of the effects of soil development over a period of time dating to the early Wisconsin Stage are Dalzell Variant, Reno, and Xerta soils.

Comparison of soil profiles and the relative age of landscapes indicates that the soils that have a distinct argillic, or Bt horizon, may have developed their primary characteristics during the Wisconsin Stage of the Pleistocene Epoch. This indicates that soil development in the Carson City Area has not been a rapid process.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (*10*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are

observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great group, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

References

(1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) League of Women Voters. 1974. Carson City, Nevada: The city behind the capitol. 64 pp., illus.

(4) Meyer, Clifford A. 1967. Yield tables for managed stands of lodgepole pine in Colorado and Wyoming. U. S. Forest Ser. Res. Pap. RM-26, 20 pp.

(5) Moore, James G. 1969. Geology and mineral deposits of Lyon, Douglas and Ormsby Counties. Nevada Bureau of Mines. 45 pp., illus.

(6) Schumacher, F. X. 1928. Normal yield tables for red fir. California Agric. Exp. Sta. Bull. No. 456, 29 pp.

(7) United States Department of Agriculture. 1938. Soils and men. U. S. Dep. Agric. Ybk. 1,232 pp., illus.

(8) United States Department of Agriculture. 1951. Diagnosis and improvement of saline and alkali soils. U. S. Dep. Agric. Handb. 60, 160 pp., illus.

(9) United States Department of Agriculture. 1951. Soil survey manual. U. S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplement issued in 1962]

(10) United States Department of Agriculture. 1971. Guide for interpreting engineering uses of soils. Soil Conserv. Ser., 87 pp., illus. [Amended in 1973]

(11) United States Department of Agriculture. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. U. S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alkaline soil. A soil that has a pH greater than 7.0. See also Reaction, soil.

Alluvial fan. A fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit. In range or pasture management, one cow, one horse, one mule, five sheep, or five goats.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Erosion pavement. A layer of gravel or stones that remains on the ground surface after fine particles are removed by wind or water. Desert pavements result from wind erosion in arid areas.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Low strength. Inadequate strength for supporting loads.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Metasedimentary rock. A metamorphic rock of sedimentary origin.

Metavolcanic rock. A metamorphic rock of volcanic origin.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly. The slow movement of water through the soil.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F		In	In	In		In
January	46.4	20.2	33.3	67	-9	59	2.16	0.77	3.26	4	7.8
February	51.8	24.5	38.2	71	2	80	1.39	.22	2.28	3	3.9
March	55.5	27.2	41.4	75	8	119	.91	.21	1.45	2	5.2
April	62.3	31.6	47.0	83	15	237	.54	.05	.91	2	1.6
May	70.8	38.9	54.9	91	23	462	.70	.14	1.14	2	1.0
June	79.7	45.4	62.6	98	30	678	.50	.03	.83	1	.0
July	89.0	50.5	69.8	100	38	924	.29	.00	.52	1	.0
August	87.4	48.3	67.9	99	35	865	.28	.00	.50	1	.0
September	80.9	40.8	60.9	94	25	627	.33	.02	.56	1	.1
October	70.0	32.2	51.1	89	14	353	.49	.06	.82	1	.4
November	56.1	25.3	40.7	75	7	83	1.14	.20	1.87	3	1.7
December	47.7	20.6	34.2	65	-4	47	2.39	.66	3.77	5	7.9
Year	66.5	33.8	50.2	101	-11	4,534	11.12	7.89	10.09	26	29.6

[1]Recorded in the period 1951-73 at Carson City, Nevada.
[2]A growing degree day is an index of the amount of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F.).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Minimum temperature[1]		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 15	May 26	June 15
2 years in 10 later than--	May 8	May 21	June 9
5 years in 10 later than--	April 25	May 10	May 26
First freezing temperature in fall:			
1 year in 10 earlier than--	September 21	September 8	September 1
2 years in 10 earlier than--	September 28	September 15	September 7
5 years in 10 earlier than--	October 12	September 29	September 19

[1]Recorded in the period 1951-73 at Carson City, Nevada.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
	Days	Days	Days
9 years in 10	136	111	84
8 years in 10	147	121	95
5 years in 10	169	141	115
2 years in 10	190	161	136
1 year in 10	202	171	147

[1]Recorded in the period 1951-73 at Carson City, Nevada.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Aldax-Indiano association	141	0.2
2	Aldax Variant-Rock outcrop complex, 30 to 50 percent slopes	223	0.3
3	Arkson-Rock outcrop complex, 30 to 50 percent slopes	1,333	1.6
4	Bishop loam, saline	1,122	1.3
5	Cagle-Nosrac association	5,039	5.8
6	Cagwin gravelly sand, 15 to 30 percent slopes	906	1.1
7	Cagwin-Toem complex, 30 to 75 percent slopes	1,316	1.5
8	Corbett gravelly sand, 8 to 15 percent slopes	332	0.4
9	Corbett gravelly sand, 30 to 50 percent slopes	1,077	1.3
10	Corbett-Toiyabe association	452	0.5
11	Cradlebaugh loam, strongly saline-alkali	168	0.2
12	Dalzell fine sandy loam, deep water table	536	0.6
13	Dalzell Variant fine sandy loam, 0 to 4 percent slopes	283	0.3
14	Deven-Rock outcrop complex, 4 to 15 percent slopes	3,015	3.5
15	Deven-Rock outcrop complex, 15 to 50 percent slopes	2,361	2.8
16	Fettic Variant very fine sandy loam, 2 to 4 percent slopes	77	0.1
17	Glenbrook gravelly loamy coarse sand, 4 to 8 percent slopes	442	0.5
18	Glenbrook-Rock outcrop complex, 8 to 30 percent slopes	638	0.7
19	Glenbrook-Rock outcrop complex, 30 to 50 percent slopes	3,874	4.5
20	Glenbrook-Rock outcrop complex, 50 to 75 percent slopes	268	0.3
21	Greenbrae gravelly sandy loam, 4 to 8 percent slopes	643	0.8
22	Greenbrae fine sandy loam, 0 to 2 percent slopes	160	0.2
23	Haybourne sand, 0 to 4 percent slopes	191	0.2
24	Haybourne sand, 8 to 15 percent slopes	159	0.2
25	Haybourne sandy loam, 0 to 2 percent slopes	956	1.1
26	Haybourne sandy loam, 4 to 8 percent slopes	746	0.9
27	Haybourne gravelly sandy loam, 2 to 4 percent slopes	1,236	1.5
28	Histic Haplaquolls, nearly level	64	0.1
29	Hocar-Rock outcrop complex, 15 to 50 percent slopes	1,483	1.7
30	Hocar-Rock outcrop complex, 15 to 30 percent slopes, eroded	1,705	2.0
31	Holbrook gravelly fine sandy loam, 4 to 8 percent slopes	172	0.2
32	Holbrook very stony fine sandy loam, 4 to 15 percent slopes	128	0.2
33	Holbrook Variant-Rock outcrop complex, 30 to 75 percent slopes	2,520	3.0
34	Incy fine sand, 4 to 30 percent slopes	2,700	3.2
35	Indiano Variant gravelly fine sandy loam, 4 to 15 percent slopes	944	1.1
36	Jubilee coarse sandy loam, 0 to 2 percent slopes	1,028	1.2
37	Jubilee sandy loam, 2 to 4 percent slopes	257	0.3
38	Kimmerling silty clay loam	178	0.2
39	Koontz-Rock outcrop complex, 30 to 50 percent slopes	244	0.3
40	Koontz-Sutro complex, 15 to 30 percent slopes	3,086	3.6
41	Koontz-Sutro complex, 30 to 50 percent slopes	4,139	4.9
42	Koontz-Sutro Variant association, moderately steep	466	0.5
43	Koontz-Sutro Variant association, steep	2,278	2.7
44	McFaul sand, 2 to 8 percent slopes	83	0.1
45	Mottsville loamy coarse sand, 2 to 4 percent slopes	45	0.1
46	Old Camp-Holbrook Variant association	1,448	1.7
47	Old Camp-Rock outcrop complex, 8 to 15 percent slopes	560	0.7
48	Old Camp-Rubble land complex, 15 to 30 percent slopes	294	0.3
49	Oppio-Nosrac association	4,260	4.9
50	Orizaba loam, saline-alkali	242	0.3
51	Prey gravelly loamy sand, 0 to 4 percent slopes	51	0.1
52	Prey fine sandy loam, gravelly substratum, 4 to 8 percent slopes	671	0.8
53	Prey gravelly fine sandy loam, gravelly substratum, 8 to 15 percent slopes	510	0.6
54	Reno cobbly fine sandy loam, 4 to 8 percent slopes	756	0.9
55	Reno gravelly clay loam, 0 to 4 percent slopes	337	0.4
56	Rock outcrop-Aldax Variant complex, 50 to 75 percent slopes	413	0.5
57	Sagouspe sand	384	0.5
58	Surprise coarse sandy loam, 2 to 4 percent slopes	1,398	1.6
59	Surprise coarse sandy loam, 4 to 8 percent slopes	1,013	1.2
60	Surprise sandy loam, 8 to 15 percent slopes	242	0.3
61	Surprise gravelly sandy loam, 0 to 2 percent slopes	1,410	1.7
62	Tarloc gravelly coarse sandy loam, 4 to 8 percent slopes	434	0.5
63	Tarloc-Glenbrook association	3,754	4.4
64	Tarloc Variant coarse sandy loam, 2 to 8 percent slopes	332	0.4
65	Toem-Rock outcrop complex, 30 to 50 percent slopes	116	0.1
66	Toem-Rock outcrop complex, 50 to 75 percent slopes	580	0.7
67	Toiyabe-Corbett complex, 30 to 50 percent slopes	3,326	3.9
68	Toiyabe-Rock outcrop complex, 30 to 50 percent slopes	1,719	2.0
69	Toiyabe-Rock outcrop complex, 50 to 75 percent slopes	524	0.6
70	Toll gravelly loamy sand, 0 to 15 percent slopes	943	1.1
71	Urban land	2,988	3.5

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
72	Ursine Variant very gravelly fine sandy loam, 8 to 15 percent slopes	275	0.3
73	Vamp fine sandy loam, drained	179	0.2
74	Vamp fine sandy loam, slightly saline-alkali	229	0.3
75	Vicee-Aldax Variant complex, 30 to 50 percent slopes	644	0.8
76	Vicee-Aldax Variant complex, 50 to 75 percent slopes	1,863	2.2
77	Voltaire silty clay loam, saline	638	0.7
78	Xerta-Rock outcrop complex, 4 to 30 percent slopes	3,109	3.7
	Water	288	0.3
	Total	85,144	100.0

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION

[Soils not listed are not in range sites; such soils can be used for grazing if grass cover is established]

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Aldax:					
[1]1:					
Aldax part	Shallow loam	Favorable	400	Big sagebrush	25
		Normal	300	Antelope bitterbrush	20
		Unfavorable	200	Bottlebrush squirreltail	20
				Douglas rabbitbrush	5
				Sandberg bluegrass	5
Indiano part	Shallow loam	Favorable	450	Antelope bitterbrush	20
		Normal	300	Bottlebrush squirreltail	20
		Unfavorable	200	Big sagebrush	20
				Desert needlegrass	10
				Douglas rabbitbrush	5
				Green ephedra	5
				Anderson peachbrush	5
Dalzell Variant:					
13	Loamy	Favorable	600	Big sagebrush	20
		Normal	450	Bottlebrush squirreltail	20
		Unfavorable	350	Antelope bitterbrush	15
				Indian ricegrass	15
				Desert needlegrass	10
				Anderson peachbrush	5
				Low sagebrush	5
				Scarlet globemallow	5
Deven:					
[1]14:					
Deven part	Thin loamy	Favorable	400	Bottlebrush squirreltail	25
		Normal	250	Low sagebrush	20
		Unfavorable	100	Bitterbrush	15
				Desert needlegrass	15
				Sandberg bluegrass	5
				Green ephedra	5
Rock outcrop part.					
[1]15:					
Deven part	Stony loam	Favorable	400	Low sagebrush	25
		Normal	250	Bottlebrush squirreltail	20
		Unfavorable	100	Bitterbrush	15
				Desert needlegrass	15
				Sandberg bluegrass	5
				Green ephedra	5
Rock outcrop part.					
Fettic Variant:					
16	Saline lowland	Favorable	1,800	Inland saltgrass	25
		Normal	1,400	Basin wildrye	20
		Unfavorable	800	Creeping wildrye	10
				Big sagebrush	10
				Black greasewood	10
				Douglas rabbitbrush	5
				Rubber rabbitbrush	5
				Anderson peachbrush	5

See footnote at end of table.

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Glenbrook:					
17	Shallow sands	Favorable	750	Big sagebrush	20
		Normal	600	Desert needlegrass	20
		Unfavorable	500	Antelope bitterbrush	15
				Bottlebrush squirreltail	15
				Thurber needlegrass	10
				Green ephedra	5
[1]18:					
Glenbrook part	Shallow sands	Favorable	750	Big sagebrush	20
		Normal	600	Desert needlegrass	20
		Unfavorable	500	Antelope bitterbrush	15
				Bottlebrush squirreltail	15
				Thurber needlegrass	10
				Green ephedra	5
Rock outcrop part.					
[1]19:					
Glenbrook part	Shallow sands	Favorable	750	Big sagebrush	20
		Normal	600	Desert needlegrass	20
		Unfavorable	500	Antelope bitterbrush	15
				Bottlebrush squirreltail	15
				Thurber needlegrass	10
				Green ephedra	5
Rock outcrop part.					
[1]20:					
Glenbrook part	Shallow sands	Favorable	750	Big sagebrush	20
		Normal	600	Desert needlegrass	20
		Unfavorable	500	Antelope bitterbrush	15
				Bottlebrush squirreltail	15
				Thurber needlegrass	10
				Green ephedra	5
Rock outcrop part.					
Greenbrae:					
21, 22	Loamy	Favorable	550	Bottlebrush squirreltail	25
		Normal	400	Big sagebrush	15
		Unfavorable	300	Antelope bitterbrush	15
				Indian ricegrass	10
				Anderson peachbrush	5
				Nevada bluegrass	5
				Scarlet globemallow	5
Haybourne:					
23, 24, 25, 26, 27	Sandy	Favorable	800	Bottlebrush squirreltail	20
		Normal	600	Antelope bitterbrush	15
		Unfavorable	450	Big sagebrush	10
				Basin wildrye	10
				Indian ricegrass	10
				Desert needlegrass	10
Hocar:					
[1]30:					
Hocar part	Shallow loam	Favorable	500	Antelope bitterbrush	20
		Normal	400	Big sagebrush	20
		Unfavorable	300	Desert needlegrass	10
				Squirreltail	10
				Green ephedra	5
				Douglas rabbitbrush	5
				Currant	5
				Tapertip hawksbeard	5
				Anderson peachbrush	5
				Spiny hopsage	5

See footnote at end of table.

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Hocar:					
[1]30:					
Rock outcrop part.					
Holbrook:					
31	Sandy	Favorable	800	Big sagebrush	25
		Normal	650	Bottlebrush squirreltail	25
		Unfavorable	550	Thurber needlegrass	20
				Green ephedra	5
				Mulesears	5
32	Sandy	Favorable	800	Bottlebrush squirreltail	25
		Normal	650	Thurber needlegrass	20
		Unfavorable	550	Big sagebrush	20
				Green ephedra	5
				Mulesears	5
Holbrook Variant:					
[1]33:					
Holbrook Variant part	Stony loam	Favorable	800	Bottlebrush squirreltail	25
		Normal	650	Thurber needlegrass	20
		Unfavorable	550	Big sagebrush	20
				Green ephedra	5
				Mulesears	5
				Tapertip hawksbeard	5
Rock outcrop part.					
Incy:					
34	Sands	Favorable	600	Antelope bitterbrush	25
		Normal	450	Squirreltail	15
		Unfavorable	350	Indian ricegrass	15
				Green ephedra	15
				Desert needlegrass	10
				Anderson peachbrush	5
Indiano Variant:					
35	Loamy	Favorable	550	Big sagebrush	25
		Normal	400	Bottlebrush squirreltail	20
		Unfavorable	350	Antelope bitterbrush	20
				Desert needlegrass	10
				Douglas rabbitbrush	5
				Green ephedra	5
Koontz:					
[1]42, [1]43:					
Koontz part	Shallow loam	Favorable	750	Antelope bitterbrush	20
		Normal	600	Big sagebrush	15
		Unfavorable	500	Bottlebrush squirreltail	15
				Desert needlegrass	10
				Green ephedra	5
				Nevada bluegrass	5
				Tapertip hawksbeard	5
				Thurber needlegrass	5
				Tailcup lupine	5
Sutro Variant part	Loamy	Favorable	1,000	Big sagebrush	20
		Normal	900	Antelope bitterbrush	20
		Unfavorable	750	Bottlebrush squirreltail	20
				Thurber needlegrass	15
				Tailcup lupine	5
				Mulesears	5
				Nevada bluegrass	5

See footnote at end of table.

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
McFaul:					
44	Loamy	Favorable	550	Big sagebrush	20
		Normal	400	Indian ricegrass	20
		Unfavorable	350	Desert needlegrass	15
				Antelope bitterbrush	15
				Bottlebrush squirreltail	15
Old Camp:					
146:					
Old Camp part	Shallow loam	Favorable	500	Bottlebrush squirreltail	20
		Normal	400	Big sagebrush	15
		Unfavorable	300	Indian ricegrass	15
				Thurber needlegrass	10
				Spiny hopsage	5
				Weber ricegrass	5
				Sandberg bluegrass	5
				Basin wildrye	5
Holbrook Variant part	Stony loam	Favorable	800	Bottlebrush squirreltail	25
		Normal	650	Thurber needlegrass	20
		Unfavorable	550	Big sagebrush	20
				Green ephedra	5
				Mulesears	5
				Tapertip hawksbeard	5
147:					
Old Camp part	Shallow loam	Favorable	500	Bottlebrush squirreltail	20
		Normal	400	Big sagebrush	15
		Unfavorable	300	Indian ricegrass	15
				Thurber needlegrass	10
				Spiny hopsage	5
				Weber ricegrass	5
				Sandberg bluegrass	5
				Basin wildrye	5
Rock outcrop part.					
148:					
Old Camp part	Shallow loam	Favorable	500	Bottlebrush squirreltail	20
		Normal	400	Big sagebrush	15
		Unfavorable	300	Indian ricegrass	15
				Thurber needlegrass	10
				Spiny hopsage	5
				Weber ricegrass	5
				Sandberg bluegrass	5
				Basin wildrye	5
Rubble land part.					
Oppio:					
149:					
Oppio part	Stony loam	Favorable	800	Big sagebrush	20
		Normal	650	Antelope bitterbrush	20
		Unfavorable	500	Desert needlegrass	15
				Bottlebrush squirreltail	15
				Spiny horsebrush	5
				Douglas rabbitbrush	5
				Green ephedra	5
				Low sagebrush	5
Nosrac part.					
Orizaba:					
50	Saline lowland	Favorable	1,800	Inland saltgrass	20
		Normal	1,400	Black greasewood	15
		Unfavorable	800	Alkali sacaton	10
				Rubber rabbitbrush	10
				Basin wildrye	10
				Alkali cordgrass	10
				Seepweed	5

See footnote at end of table.

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Prey:					
51, 52, 53	Loamy	Favorable	700	Big sagebrush	25
		Normal	600	Bottlebrush squirreltail	20
		Unfavorable	500	Antelope bitterbrush	20
				Desert needlegrass	15
				Indian ricegrass	10
				Douglas rabbitbrush	5
Reno:					
54	Loamy	Favorable	800	Desert needlegrass	30
		Normal	650	Big sagebrush	15
		Unfavorable	500	Bottlebrush squirreltail	15
				Indian ricegrass	10
				Low sagebrush	5
				Bluegrass	5
				Sedge	5
55	Thin loamy	Favorable	450	Bottlebrush squirreltail	20
		Normal	350	Low sagebrush	15
		Unfavorable	250	Antelope bitterbrush	15
				Desert needlegrass	15
				Sedge	10
				Big sagebrush	5
				Bluegrass	5
Sagouspe:					
57	Subirrigated	Favorable	1,800	Basin wildrye	15
		Normal	1,500	Big sagebrush	15
		Unfavorable	1,200	Indian ricegrass	10
				Creeping wildrye	10
				Inland saltgrass	10
				Willow	10
				Bluegrass	5
				Wildrose	5
Surprise:					
58, 59, 60, 61	Sandy	Favorable	900	Bitterbrush	20
		Normal	650	Big sagebrush	20
		Unfavorable	400	Bottlebrush squirreltail	10
				Indian ricegrass	10
				Green ephedra	5
				Douglas rabbitbrush	5
				Tailcup lupine	5
Tarloc:					
62	Stony loam	Favorable	600	Antelope bitterbrush	20
		Normal	500	Big sagebrush	20
		Unfavorable	400	Desert needlegrass	15
				Bottlebrush squirreltail	15
				Green ephedra	5
				Sandberg bluegrass	5
				Anderson peachbrush	5
[1]63:					
Tarloc part	Stony loam	Favorable	600	Antelope bitterbrush	20
		Normal	500	Big sagebrush	20
		Unfavorable	400	Desert needlegrass	15
				Bottlebrush squirreltail	15
				Green ephedra	5
				Sandberg bluegrass	5
				Anderson peachbrush	5
Glenbrook part	Shallow sands	Favorable	750	Big sagebrush	20
		Normal	600	Desert needlegrass	20
		Unfavorable	500	Antelope bitterbrush	15
				Bottlebrush squirreltail	15
				Thurber needlegrass	10
				Green ephedra	5

See footnote at end of table.

TABLE 5.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Toll:					
70	Sandy	Favorable	700	Indian ricegrass	20
		Normal	600	Bottlebrush squirreltail	20
		Unfavorable	550	Big sagebrush	15
				Desert needlegrass	15
				Antelope bitterbrush	10
				Green ephedra	5
Ursine Variant:					
72	Calcareous loam	Favorable	650	Antelope bitterbrush	20
		Normal	500	Indian ricegrass	15
		Unfavorable	400	Desert needlegrass	15
				Big sagebrush	10
				Green ephedra	10
				Bottlebrush squirreltail	10
Xerta:					
[1]78:					
Xerta part	Rocky loam	Favorable	500	Bottlebrush squirreltail	25
		Normal	350	Desert needlegrass	15
		Unfavorable	250	Big sagebrush	15
				Antelope bitterbrush	15
				Nevada bluegrass	5
				Green ephedra	5
				Low sagebrush	5
Rock outcrop part.					

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry in a column indicates the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity	
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index
Aldax Variant:								
12:								
Aldax Variant part	2d	Moderate	Moderate	Moderate	Slight	Moderate	Jeffrey pine	77
Rock outcrop part.								
Arkson:								
13:								
Arkson part	5r	Slight	Moderate	Slight	Slight	Slight	Lodgepole pine	55
							Western white pine	35
Rock outcrop part.								
Cagle:								
15:								
Cagle part	3c	Moderate	Moderate	Moderate	Moderate	Slight	Singleleaf pinyon	20
							Utah juniper	20
Nosrac part	2r	Moderate	Moderate	Moderate	Slight	Moderate	Singleleaf pinyon	71
							Utah juniper	71
Cagwin:								
6	4s	Severe	Moderate	Moderate	Moderate	Moderate	California red fir	26
17:								
Cagwin part	4s	Severe	Moderate	Moderate	Moderate	Moderate	California red fir	26
Toem part	5x	Severe	Severe	Severe	Moderate	Moderate	Western white pine	35
Corbett:								
8	3r	Slight	Slight	Moderate	Slight	Moderate	Jeffrey pine	69
9	3r	Moderate	Moderate	Moderate	Slight	Moderate	Jeffrey pine	69
110:								
Corbett part	3r	Moderate	Moderate	Moderate	Slight	Moderate	Jeffrey pine	69
Toiyabe part	4x	Severe	Severe	Moderate	Moderate	Moderate	Jeffrey pine	69
Hocar:								
129:								
Hocar part	2r	Moderate	Moderate	Slight	Moderate	Moderate	Singleleaf pinyon	59
Rock outcrop part.								
Koontz:								
139:								
Koontz part	2r	Slight	Moderate	Slight	Slight	Slight	Singleleaf pinyon	66
							Utah juniper	66
Rock outcrop part.								

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity	
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index
Koontz: [1]40, [1]41:								
Koontz part	2r	Slight	Moderate	Slight	Slight	Slight	Singleleaf pinyon Utah juniper	66 66
Sutro part	2r	Slight	Moderate	Slight	Slight	Slight	Singleleaf pinyon Utah juniper	66 66
[1]42, [1]43:								
Koontz part	2r	Slight	Moderate	Slight	Slight	Slight	Singleleaf pinyon Utah juniper	66 66
Sutro Variant part.								
Oppio: [1]49:								
Oppio part.								
Nosrac part	2r	Moderate	Moderate	Moderate	Slight	Moderate	Singleleaf pinyon Utah juniper	71 71
Rock outcrop: [1]56:								
Rock outcrop part.								
Aldax Variant part	2d	Severe	Severe	Moderate	Moderate	Moderate	Jeffrey pine	77
Tarloc Variant: 64	4d	Moderate	Slight	Slight	Slight	Moderate	Jeffrey pine	74
Toem: [1]65, [1]66:								
Toem part	5x	Severe	Severe	Severe	Moderate	Moderate	Western white pine	35
Rock outcrop part.								
Toiyabe: [1]67:								
Toiyabe part	4x	Severe	Severe	Moderate	Moderate	Moderate	Jeffrey pine	83
Corbett part	3r	Moderate	Moderate	Moderate	Slight	Moderate	Jeffrey pine	69
[1]68, [1]69:								
Toiyabe part	4x	Severe	Severe	Moderate	Moderate	Moderate	Jeffrey pine	83
Rock outcrop part.								
Vicee: [1]75:								
Vicee part	3r	Severe	Severe	Moderate	Slight	Slight	Jeffrey pine	89
Aldax Variant part	2d	Moderate	Moderate	Moderate	Slight	Moderate	Jeffrey pine	77
[1]76:								
Vicee part	3r	Severe	Severe	Moderate	Slight	Slight	Jeffrey pine	89
Aldax Variant part	2d	Severe	Severe	Moderate	Moderate	Moderate	Jeffrey pine	77

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Aldax:					
1:					
Aldax part	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Indiano part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Aldax Variant:					
2:					
Aldax Variant part	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Rock outcrop part.					
Arkson:					
3:					
Arkson part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop part.					
Bishop:					
4	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: frost action, wetness.
Cagle:					
5:					
Cagle part	Severe: slope, too clayey.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, low strength, shrink-swell.
Nosrac part	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cagwin:					
6	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7:					
Cagwin part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Toem part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Corbett:					
8, 9	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Corbett:					
110:					
Corbett part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Toiyabe part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cradlebaugh:					
11	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, frost action.
Dalzell:					
12	Moderate: cemented pan, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action, low strength.
Dalzell Variant:					
13	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Deven:					
114:					
Deven part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Rock outcrop part.					
115:					
Deven part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop part.					
Fettic Variant:					
16	Moderate: cemented pan.	Slight	Moderate: shrink-swell.	Slight	Severe: frost action, low strength.
Glenbrook:					
17	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.
118:					
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					
119:					
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Glenbrook:					
120:					
Glenbrook part-	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					
Greenbrae:					
21	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: slope, shrink-swell, low strength.	Moderate: shrink-swell, frost action, low strength.
22	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, frost action, low strength.
Haybourne:					
23, 25, 26, 27	Moderate: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.
24	Moderate: slope, cutbanks cave, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: slope, frost action, floods.
Histic Haplaquolls:					
28	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, frost action.
Hocar:					
129:					
Hocar part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					
130:					
Hocar part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					
Holbrook:					
31	Severe: small stones, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.
32	Severe: small stones, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: slope, floods.	Moderate: slope, floods, frost action.
Holbrook Variant:					
133:					
Holbrook Variant part-	Severe: slope, depth to rock. small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Holbrook Variant:					
[1]33:					
Rock outcrop part.					
Incy:					
34	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Indiano Variant:					
35	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.
Jubilee:					
36, 37	Severe: wetness, cutbanks cave.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action.
Kimmerling:					
38	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, frost action.
Koontz:					
[1]39:					
Koontz part	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.					
[1]40:					
Koontz part	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Sutro part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]41:					
Koontz part	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope.
Sutro part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]42:					
Koontz part	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]43:					
Koontz part	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Koontz:					
143:					
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
McFaul:					
44	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.
Mottsville:					
45	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Old Camp:					
146:					
Old Camp part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Holbrook Variant part	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
147:					
Old Camp part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Rock outcrop part.					
148:					
Old Camp part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rubble land part.					
Oppio:					
149:					
Oppio part	Severe: slope, depth to rock, too clayey.	Severe: slope, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.
Nosrac part	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Orizaba:					
50	Moderate: wetness, floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: wetness, frost action, low strength.
Prey:					
51	Moderate: cemented pan, cutbanks cave.	Slight	Moderate: cemented pan.	Slight	Moderate: frost action, cemented pan.
52	Moderate: floods, cemented pan.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action, cemented pan.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Prey:					
53	Moderate: slope, floods, cemented pan.	Severe: floods.	Severe: floods.	Severe: slope, floods.	Moderate: slope, frost action, cemented pan.
Reno:					
54, 55	Severe: cemented pan.	Severe: shrink-swell, low strength.	Severe: shrink-swell, cemented pan.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Rock outcrop:					
[1]56:					
Rock outcrop part.					
Aldax Variant part	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Sagouspe:					
57	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, wetness, frost action.
Surprise:					
58, 59, 61	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.
60	Moderate: slope, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: slope, floods, frost action.
Tarloc:					
62	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.
[1]63:					
Tarloc part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Tarloc Variant:					
64	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.
Toem:					
[1]65:					
Toem part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Rock outcrop part.					
[1]66:					
Toem part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Rock outcrop part.					

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Toiyabe:					
167:					
Toiyabe part---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Corbett part---	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
168:					
Toiyabe part---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop part.					
169:					
Toiyabe part---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop part.					
Toll:					
70----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Urban land:					
71.					
Ursine Variant:					
72----------	Moderate: cemented pan, slope.	Severe: cemented pan.	Severe: cemented pan.	Severe: slope, cemented pan.	Moderate: slope, frost action, cemented pan.
Vamp:					
73----------	Moderate: cemented pan, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: frost action.
74----------	Moderate: wetness, cemented pan, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: frost action.
Vicee:					
175:					
Vicee part-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Aldax Variant part----------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
176:					
Vicee part-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Aldax Variant part----------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Voltaire:					
77----------	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Xerta: [1]78:					
Xerta part	Severe: depth to rock, large stones.	Severe: slope, shrink-swell, low strength.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
Rock outcrop part.					

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Aldax:					
1:					
Aldax part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Indiano part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Aldax Variant:					
2:					
Aldax Variant part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, small stones.
Rock outcrop part.					
Arkson:					
3:					
Arkson part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop part.					
Bishop:					
4	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Cagle:					
5:					
Cagle part	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock,	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey.
Nosrac part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Cagwin:					
6	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, too sandy, seepage.
7:					
Cagwin part	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, too sandy, seepage.
Toem part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Corbett:					
8	Severe: slope.	Severe: slope, seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, seepage.
9	Severe: slope.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, seepage.
[1]10:					
Corbett part	Severe: slope.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, seepage.
Toiyabe part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Cradlebaugh:					
11	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Dalzell.					
12	Severe: cemented pan, percs slowly.	Slight	Moderate: floods, cemented pan.	Moderate: floods.	Fair: thin layer.
Dalzell Variant:					
13	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: too clayey.
Deven:					
[1]14:					
Deven part	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, small stones.
Rock outcrop part.					
[1]15:					
Deven part	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope.
Rock outcrop part.					
Fettic Variant:					
16	Severe: cemented pan, percs slowly.	Moderate: slope, cemented pan.	Moderate: cemented pan.	Slight	Poor: thin layer.
Glenbrook:					
17	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer, area reclaim, seepage.
[1]18:					
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Glenbrook:					
18:					
Rock outcrop part.					
19:					
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					
20:					
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					
Greenbrae:					
21, 22	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Haybourne:					
23, 25, 26, 27	Moderate: floods.	Severe: seepage, floods.	Moderate: floods.	Moderate: floods.	Good.
24	Moderate: slope, floods.	Severe: slope, seepage, floods.	Moderate: floods.	Moderate: slope, floods.	Fair: slope.
Histic Haplaquolls:					
28	Severe: wetness, floods.	Severe: wetness, excess humus.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Hocar:					
29:					
Hocar part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Rock outcrop part.					
30:					
Hocar part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Rock outcrop part.					
Holbrook:					
31	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Severe: seepage.	Poor: small stones.
32	Moderate: slope, floods, large stones.	Severe: slope, floods, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Holbrook Variant:					
[1]33:					
Holbrook Variant part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Poor: slope, small stones.
Rock outcrop part.					
Incy:					
34	Severe: slope.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: slope, seepage.	Poor: too sandy, slope, seepage.
Indiano Variant:					
35	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, slope, small stones.
Jubilee:					
36, 37	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Kimmerling:					
38	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Koontz:					
[1]39:					
Koontz part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
Rock outcrop part.					
[1]40:					
Koontz part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
Sutro part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
[1]41:					
Koontz part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope.	Poor: slope, thin layer, large stones.
Sutro part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
[1]42:					
Koontz part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Koontz:					
142:					
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
143:					
Koontz part	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
McFaul:					
44	Slight	Severe: seepage.	Moderate: seepage.	Slight	Fair: too sandy.
Mottsville:					
45	Moderate: floods.	Severe: floods, seepage.	Moderate: floods, too sandy.	Moderate: floods.	Fair: too sandy.
Old Camp:					
146:					
Old Camp part	Severe: slope, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, large stones.
Holbrook Variant part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, small stones.	Severe: slope.	Poor: slope, small stones.
147:					
Old Camp part	Severe: depth to rock.	Severe: slope, depth to rock, large stones.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, large stones.
Rock outcrop part.					
148:					
Old Camp part	Severe: slope, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, large stones.
Rubble land part.					
Oppio:					
149:					
Oppio part	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey.
Nosrac part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Orizaba:					
50	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Prey:					
51	Severe: cemented pan.	Severe: seepage.	Moderate: too sandy, cemented pan.	Slight	Fair: thin layer, too sandy.
52	Severe: cemented pan.	Severe: seepage, floods.	Moderate: floods, cemented pan, too sandy.	Moderate: floods.	Fair: thin layer, too sandy.
53	Severe: cemented pan.	Severe: slope, seepage, floods.	Moderate: floods, cemented pan, too sandy.	Moderate: slope, floods.	Fair: thin layer, too sandy.
Reno:					
54, 55	Severe: percs slowly, cemented pan.	Severe: seepage.	Severe: cemented pan.	Slight	Fair: too clayey, thin layer, small stones.
Rock outcrop:					
[1]56:					
Rock outcrop part.					
Aldax Variant part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, small stones.
Sagouspe:					
57	Severe: wetness.	Severe: floods, seepage, wetness.	Severe: wetness, seepage.	Moderate: floods, wetness.	Poor: too sandy.
Surprise:					
58, 59, 61	Slight	Severe: seepage, floods.	Severe: seepage.	Moderate: floods.	Fair: small stones.
60	Moderate: slope.	Severe: seepage, slope, floods.	Severe: seepage.	Moderate: floods, slope.	Fair: slope, small stones.
Tarloc:					
62	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
[1]63:					
Tarloc part	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Glenbrook part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Tarloc Variant:					
64	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: seepage.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Toem:					
165:					
Toem part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
Rock outcrop part.					
166:					
Toem part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
Rock outcrop part.					
Toiyabe:					
167:					
Toiyabe part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Corbett part	Severe: slope.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, seepage.
168:					
Toiyabe part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					
169:					
Toiyabe part	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					
Toll:					
70	Slight	Severe: seepage.	Moderate: seepage.	Slight	Fair: too sandy.
Urban land:					
71.					
Ursine Variant:					
72	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.	Moderate: slope.	Poor: thin layer, small stones.
Vamp:					
73	Severe: cemented pan.	Severe: seepage.	Severe: wetness, seepage.	Severe: seepage.	Fair: thin layer, hard to pack.
74	Severe: wetness, cemented pan.	Moderate: wetness, seepage, cemented pan.	Severe: wetness.	Moderate: wetness, floods.	Fair: thin layer, hard to pack.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Vicee:					
[1]75:					
Vicee part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Aldax Variant part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, small stones.
[1]76:					
Vicee part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Aldax Variant part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, small stones.
Voltaire:					
77	Severe: wetness, percs slowly.	Severe: wetness:	Severe: wetness.	Severe: wetness.	Poor: wetness.
Xerta:					
[1]78:					
Xerta part	Severe: slope, depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: slope.	Poor: slope, large stones.
Rock outcrop part.					

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 9.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Aldax:				
[1]1:				
Aldax part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, large stones, area reclaim.
Indiano part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Aldax Variant:				
[1]2:				
Aldax Variant part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, large stones, small stones.
Rock outcrop part.				
Arkson:				
[1]3:				
Arkson part	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones, small stones.
Rock outcrop part.				
Bishop:				
4	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness, excess salt.
Cagle:				
[1]5:				
Cagle part	Poor: shrink-swell, slope, thin layer.	Unsuited	Unsuited	Poor: too clayey, large stones, slope.
Nosrac part	Poor: slope.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Cagwin:				
6	Fair: slope, thin layer.	Poor: excess fines.	Unsuited	Poor: slope, too sandy, small stones.
[1]7:				
Cagwin part	Poor: slope.	Poor: excess fines.	Unsuited	Poor: slope, too sandy, small stones.
Toem part	Poor: slope, thin layer.	Unsuited	Unsuited	Poor: slope, small stones, too sandy.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Corbett:				
8	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
9	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
[1]10:				
Corbett part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, large stones.
Toiyabe part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, large stones.
Cradlebaugh:				
11	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: excess salt.
Dalzell:				
12	Fair: frost action, low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer, excess salt.
Dalzell Variant:				
13	Fair: low strength, frost action.	Unsuited	Unsuited	Fair: thin layer.
Deven:				
[1]14:				
Deven part	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: thin layer, small stones.
Rock outcrop part.				
[1]15:				
Deven part	Poor: slope, thin layer, shrink-swell.	Unsuited	Unsuited	Poor: thin layer, small stones, slope.
Rock outcrop part.				
Fettic Variant:				
16	Poor: thin layer, frost action, low strength.	Unsuited	Unsuited	Poor: excess salt, excess sodium.
Glenbrook:				
17	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: too sandy, area reclaim, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Glenbrook:				
[1]18:				
Glenbrook part	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
Rock outcrop part.				
[1]19:				
Glenbrook part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
Rock outcrop part.				
[1]20:				
Glenbrook part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
Rock outcrop part.				
Greenbrae:				
21	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Poor: small stones.
22	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Fair: small stones.
Haybourne:				
23, 24	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Poor: too sandy.
25, 26	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Good.
27	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Poor: small stones.
Histic Haplaquolls:				
28	Poor: wetness, frost action.			Poor: wetness.
Hocar:				
[1]29:				
Hocar part	Poor: thin layer, slope, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope.
Rock outcrop part.				
[1]30:				
Hocar part	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope.
Rock outcrop part.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Holbrook:				
31	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
32	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: large stones, small stones.
Holbrook Variant:				
[1]33:				
Holbrook Variant part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, large stones, small stones.
Rock outcrop part.				
Incy:				
34	Fair: slope.	Fair: excess fines.	Unsuited	Poor: slope, too sandy.
Indiano Variant:				
35	Fair: frost action, thin layer, area reclaim.	Unsuited	Unsuited	Poor: small stones.
Jubilee:				
36, 37	Poor: wetness, frost action.	Poor: excess fines.	Unsuited	Poor: wetness.
Kimmerling:				
38	Poor: wetness, frost action, low strength.	Unsuited	Unsuited	Poor: wetness.
Koontz:				
[1]39:				
Koontz part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, small stones.
Rock outcrop part.				
[1]40:				
Koontz part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, small stones.
Sutro part	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, small stones, large stones.
[1]41:				
Koontz part	Poor: slope, thin layer, large stones.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Sutro part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, small stones, large stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Koontz:				
142:				
Koontz part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Sutro Variant part	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones.
143:				
Koontz part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Sutro Variant part	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones.
McFaul:				
144	Fair: frost action.	Fair: excess fines.	Unsuited	Poor: too sandy.
Mottsville:				
145	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
Old Camp:				
146:				
Old Camp part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, area reclaim.
Holbrook Variant part	Poor: thin layer, area reclaim.	Unsuited	Poor: excess fines.	Poor: slope, large stones, small stones.
147:				
Old Camp part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: large stones, area reclaim.
Rock outcrop part.				
148:				
Old Camp part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, area reclaim.
Rubble land part.				
Oppio:				
149:				
Oppio part	Poor: slope, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, thin layer.
Nosrac part	Poor: slope.	Unsuited	Unsuited	Poor: slope, large stones, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Orizaba:				
50	Poor: low strength, frost action, wetness.	Unsuited	Unsuited	Poor: excess salt, excess sodium, wetness.
Prey:				
51	Fair: frost action.	Poor: excess fines.	Unsuited	Poor: too sandy.
52	Fair: frost action.	Poor: excess fines.	Fair: excess fines.	Good.
53	Fair: frost action.	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
Reno:				
54, 55	Poor: shrink-swell, low strength.	Fair: excess fines.	Fair: excess fines.	Poor: small stones, thin layer.
Rock outcrop:				
[1]56:				
Rock outcrop part.				
Aldax Variant part	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, large stones, small stones.
Sagouspe:				
57	Fair: frost action.	Poor: excess fines.	Unsuited	Poor: too sandy.
Surprise:				
58, 59	Fair: frost action.	Poor: excess fines.	Unsuited	Fair: small stones.
60	Fair: frost action.	Poor: excess fines.	Unsuited	Fair: small stones, slope.
61	Fair: frost action.	Poor: excess fines.	Unsuited	Poor: small stones.
Tarloc:				
62	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: small stones.
[1]63:				
Tarloc part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, small stones.
Glenbrook part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
Tarloc Variant:				
64	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Toem:				
[1]65:				
Toem part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, large stones, small stones.
Rock outcrop part.				
[1]66:				
Toem part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, large stones, small stones.
Rock outcrop part.				
Toiyabe:				
[1]67:				
Toiyabe part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, large stones.
Corbett part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, small stones.
[1]68:				
Toiyabe part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, large stones.
Rock outcrop part.				
[1]69:				
Toiyabe part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, too sandy, area reclaim.
Rock outcrop part.				
Toll:				
70	Good	Fair: excess fines.	Unsuited	Poor: too sandy, small stones.
Urban land:				
71.				
Ursine Variant:				
72	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones.
Vamp:				
73, 74	Poor: frost action.	Poor: excess fines.	Unsuited	Fair: excess salt, excess sodium.
Vicee:				
[1]75:				
Vicee part	Poor: slope.	Unsuited	Unsuited	Poor: slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Vicee:				
[1]75:				
Aldax Variant part-	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, large stones, small stones.
[1]76:				
Vicee part	Poor: slope.	Unsuited	Unsuited	Poor: large stones, small stones, slope.
Aldax Variant part-	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, large stones, small stones.
Voltaire:				
77	Poor: wetness, frost action, low strength.	Unsuited	Unsuited	Poor: wetness.
Xerta:				
[1]78:				
Xerta part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Rock outcrop part.				

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 10.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Aldax:						
[1]1:						
Aldax part	Depth to rock, slope.	Thin layer, seepage.	No water	---	---	Depth to rock, slope.
Indiano part	Slope, depth to rock.	Thin layer	No water	---	---	Slope, depth to rock.
Aldax Variant:						
[1]2:						
Aldax Variant part	Slope, depth to rock.	Thin layer, piping.	No water	---	---	Depth to rock, slope, piping.
Rock outcrop part.						
Arkson:						
[1]3:						
Arkson part	Slope	Piping, large stones.	No water	---	---	Slope, piping, large stones.
Rock outcrop part.						
Bishop:						
4	Favorable	Piping, low strength, shrink-swell.	Favorable	Excess salt, wetness, floods.	Excess salt, wetness, floods.	Wetness, piping, poor outlets.
Cagle:						
[1]5:						
Cagle part	Slope, depth to rock.	Shrink-swell, large stones, low strength.	No water	---	---	Slope, depth to rock.
Nosrac part	Slope	Large stones	No water	---	---	Slope, large stones.
Cagwin:						
6	Slope, seepage.	Piping, seepage.	No water	---	---	Slope, too sandy, piping.
[1]7:						
Cagwin part	Slope, seepage.	Piping, seepage.	No water	---	---	Slope, too sandy, piping.
Toem part	Slope, seepage, depth to rock.	Thin layer, hard to pack, seepage.	No water	---	---	Depth to rock, slope, too sandy.
Corbett:						
8, 9	Seepage, slope.	Piping, seepage.	No water	---	---	Slope, too sandy, piping.
[1]10:						
Corbett part	Seepage, slope.	Piping, seepage.	No water	---	---	Slope, large stones, piping.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Corbett:						
[1]10:						
Toiyabe part---	Slope, seepage, depth to rock.	Seepage, thin layer.	No water-------	----------	----------	Depth to rock, erodes easily, slope.
Cradlebaugh:						
11----------	Seepage--------	Low strength, shrink-swell.	Salty water----	Wetness, floods, poor outlets.	Wetness, floods, excess salt.	Wetness.
Dalzell:						
12----------	Favorable------	Piping, low strength, shrink-swell.	No water-------	----------	----------	Cemented pan, piping, percs slowly.
Dalzell Variant:						
13----------	Slope----------	Low strength, piping.	No water-------	----------	----------	Percs slowly, slope, piping.
Deven:						
[1]14:						
Deven part-----	Slope, depth to rock.	Low strength, thin layer, shrink-swell.	No water-------	----------	----------	Depth to rock, slope, percs slowly.
Rock outcrop part.						
[1]15:						
Deven part-----	Slope, depth to rock.	Low strength, thin layer, shrink-swell.	No water-------	----------	----------	Depth to rock, slope, percs slowly.
Rock outcrop part.						
Fettic Variant:						
16----------	Slope, cemented pan.	Shrink-swell, piping, low strength.	Salty water, deep to water, slow refill.	----------	----------	Cemented pan, piping, slope.
Glenbrook:						
17----------	Slope, depth to rock, seepage.	Seepage, thin layer.	No water-------	----------	----------	Slope, too sandy.
[1]18:						
Glenbrook part-	Slope, depth to rock, seepage.	Seepage, thin layer.	No water-------	----------	----------	Slope, too sandy.
Rock outcrop part.						
[1]19:						
Glenbrook part-	Slope, depth to rock, seepage.	Seepage, thin layer.	No water-------	----------	----------	Slope, too sandy.
Rock outcrop part.						
[1]20:						
Glenbrook part-	Slope, depth to rock, seepage.	Seepage, thin layer.	No water-------	----------	----------	Slope, too sandy.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Glenbrook:						
[1]20:						
Rock outcrop part.						
Greenbrae:						
21	Slope	Low strength, piping.	No water	Perco slowly	Slope, perco slowly.	Slope, perco slowly, piping.
22	Favorable	Low strength, piping.	No water	Perco slowly	Perco slowly	Perco slowly, piping.
Haybourne:						
23, 24	Seepage, slope.	Piping, seepage, low strength.	No water	Slope	Droughty, fast intake, slope.	Piping, slope.
25	Seepage	Piping, seepage, low strength.	No water	Favorable	Droughty	Piping.
26, 27	Seepage, slope.	Piping, seepage, low strength.	No water	Slope	Droughty, slope.	Piping, slope.
Histic Haplaquolls:						
28	Excess humus	Excess humus, compressible.	Favorable	---	---	Wetness, poor outlets.
Hocar:						
[1]29:						
Hocar part	Depth to rock, slope.	Piping, thin layer.	No water	---	---	Depth to rock, slope, piping.
Rock outcrop part.						
[1]30:						
Hocar part	Depth to rock, slope.	Piping, thin layer.	No water	---	---	Depth to rock, slope, piping.
Rock outcrop part.						
Holbrook:						
31	Seepage, slope.	Seepage, piping.	No water	Cutbanks cave, slope, floods.	Slope, droughty.	Slope, piping.
32	Slope, seepage.	Large stones, seepage, piping.	No water	Cutbanks cave, slope, floods.	Droughty, slope, seepage.	Slope, large stones, piping.
Holbrook Variant:						
[1]33:						
Holbrook Variant part	Slope, depth to rock, seepage.	Large stones, piping.	No water	---	---	Slope, large stones, depth to rock.
Rock outcrop part.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Incy:						
34	Seepage, slope.	Seepage, piping.	No water	Slope, cutbanks cave.	Droughty, fast intake, slope.	Slope, soil blowing, too sandy.
Indiano Variant:						
35	Slope, depth to rock.	Thin layer	No water			Slope, depth to rock.
Jubilee:						
36	Seepage	Seepage, piping.	Favorable	Wetness, cutbanks cave, poor outlets.	Wetness, seepage.	Wetness, poor outlets.
37	Seepage	Seepage, piping.	Favorable	Wetness, cutbanks cave, poor outlets.	Wetness, slope, seepage.	Wetness, slope.
Kimmerling:						
38	Favorable	Low strength, shrink-swell.	Slow refill	Wetness, floods, poor outlets.	Wetness, floods.	Wetness, poor outlets.
Koontz:						
[1]39:						
Koontz part	Slope, depth to rock.	Thin layer	No water			Slope, depth to rock.
Rock outcrop part.						
[1]40:						
Koontz part	Slope, depth to rock.	Thin layer	No water			Slope, depth to rock.
Sutro part	Slope, depth to rock.	Large stones, low strength, piping.	No water			Slope, depth to rock, piping.
[1]41:						
Koontz part	Slope, depth to rock.	Thin layer, large stones.	No water			Slope, depth to rock, large stones.
Sutro part	Slope, depth to rock.	Large stones, low strength, piping.	No water			Slope, depth to rock, piping.
[1]42:						
Koontz part	Slope, depth to rock.	Thin layer, large stones.	No water			Slope, depth to rock, large stones.
Sutro Variant part	Slope	Low strength, piping, large stones.	No water			Slope, large stones, piping.
[1]43:						
Koontz part	Slope, depth to rock.	Thin layer, large stones.	No water			Slope, depth to rock, large stones.
Sutro Variant part	Slope	Low strength, piping, large stones.	No water			Slope, large stones, piping.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
McFaul:						
44	Seepage	Seepage, piping.	No water	Slope	Slope, fast intake, droughty.	Slope, too sandy, piping.
Mottsville:						
45	Slope, seepage.	Seepage, piping, hard to pack.	No water	Slope, floods.	Slope, droughty, soil blowing.	Slope, too sandy, erodes easily.
Old Camp:						
146:						
Old Camp part	Slope,	Thin layer,	No water	---	---	Depth to rock, slope.
Holbrook Variant part	Slope, seepage.	Large stones,	No water	---	---	Slope, depth to rock.
147:						
Old Camp part	Slope, depth to rock.	Thin layer, large stones.	No water	---	---	Depth to rock, large stones, slope.
Rock outcrop part.						
148:						
Old Camp part	Slope, depth to rock.	Thin layer, large stones.	No water	---	---	Depth to rock, large stones, slope.
Rubble land part.						
Oppio:						
149:						
Oppio part	Slope, depth to rock.	Large stones, depth to rock, shrink-swell.	No water	---	---	Slope, large stones, depth to rock.
Nosrac part	Slope	Large stones	No water	---	---	Slope, large stones.
Orizaba:						
50	Favorable	Low strength, compressible.	Salty water	---	---	Wetness, poor outlets.
Prey:						
51	Seepage, slope.	Seepage, piping.	No water	Slope, cemented pan.	Slope, droughty, rooting depth.	Slope, cemented pan, piping.
52, 53	Slope, seepage.	Seepage, piping.	No water	---	---	Slope, piping, cemented pan.
Reno:						
54, 55	Slope, seepage.	Shrink-swell, low strength.	No water	---	---	Slope, cemented pan, percs slowly.
Rock outcrop:						
156:						
Rock outcrop part.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Rock outcrop:						
156:						
Aldax Variant part	Slope, depth to rock.	Thin layer, piping.	No water			Depth to rock, slope, piping.
Sagouspe:						
57	Seepage	Piping, seepage.	Deep to water	Wetness, poor outlets, cutbanks cave.	Fast intake, droughty, wetness.	Piping, too sandy, poor outlets.
Surprise:						
58, 59, 60	Seepage, slope.	Piping, seepage.	No water	Slope	Slope, droughty.	Piping, slope.
61	Seepage	Piping, seepage.	No water	Favorable	Droughty	Piping.
Tarloc:						
62	Slope, depth to rock.	Low strength, piping.	No water			Slope, depth to rock
163:						
Tarloc part	Slope, depth to rock.	Low strength, piping.	No water			Slope, depth to rock
Glenbrook part	Slope, depth to rock, seepage.	Seepage, thin layer.	No water			Slope, too sandy.
Tarloc Variant:						
64	Depth to rock, slope, seepage.	Thin layer, piping, seepage.	No water			Slope, depth to rock piping.
Toem:						
165:						
Toem part	Slope, seepage, depth to rock.	Thin layer, hard to pack, seepage.	No water			Depth to rock, slope, too sandy.
Rock outcrop part.						
166:						
Toem part	Slope, seepage, depth to rock.	Thin layer, hard to pack, seepage.	No water			Depth to rock, slope, too sandy.
Rock outcrop part.						
Toiyabe:						
167:						
Toiyabe part	Slope, seepage, depth to rock.	Seepage, thin layer.	No water			Depth to rock, erodes easily slope.
Corbett part	Seepage, slope.	Piping, seepage.	No water			Slope, too sandy, piping.
168:						
Toiyabe part	Slope, seepage, depth to rock.	Seepage, thin layer.	No water			Depth to rock, erodes easily slope.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Toiyabe:						
[1]68:						
Rock outcrop part.						
[1]69:						
Toiyabe part	Slope, seepage, depth to rock.	Hard to pack, seepage, thin layer.	No water	---	---	Depth to rock, erodes easily, slope.
Rock outcrop part.						
Toll:						
70	Seepage, slope.	Piping	No water	Slope	Droughty, seepage, slope.	Soil blowing, too sandy, slope.
Urban land:						
71.						
Ursine Variant:						
72	Slope, cemented pan.	Thin layer	No water	---	---	Slope, cemented pan, rooting depth.
Vamp:						
73	Cemented pan, seepage.	Piping, seepage.	Deep to water	Cemented pan, excess salt, excess sodium.	Rooting depth, excess salt, excess sodium.	Piping, cemented pan.
74	Seepage, cemented pan.	Seepage, piping, hard to pack.	Deep to water	Cemented pan, wetness, frost action.	---	Piping, wetness, cemented pan.
Vicee:						
[1]75:						
Vicee part	Slope	Piping, low strength, hard to pack.	No water	---	---	Slope, erodes easily, piping.
Aldax Variant part	Slope, depth to rock.	Thin layer, piping.	No water	---	---	Depth to rock, slope, piping.
[1]76:						
Vicee part	Slope	Piping, low strength, hard to pack.	No water	---	---	Slope, erodes easily, piping.
Aldax Variant part	Slope, depth to rock.	Thin layer, piping.	No water	---	---	Depth to rock, slope, piping.
Voltaire:						
77	Favorable	Compressible, low strength, excess salt.	Salty water	Wetness, percs slowly, excess salt.	Wetness, percs slowly, excess salt.	Wetness, percs slowly, poor outlets.
Xerta:						
[1]78:						
Xerta part	Slope, depth to rock.	Depth to rock, shrink-swell, large stones.	No water	---	---	Slope, depth to rock, percs slowly.
Rock outcrop part.						

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Aldax:				
1:				
Aldax part	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, small stones.	Severe: slope.
Indiano part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Aldax Variant:				
2:				
Aldax Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop part.				
Arkson:				
3:				
Arkson part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop part.				
Bishop:				
4	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Cagle:				
5:				
Cagle part	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
Nosrac part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Cagwin:				
6	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, small stones, too sandy.	Severe: dusty, too sandy.
7:				
Cagwin part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, small stones, too sandy.	Severe: slope, dusty, too sandy.
Toem part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, dusty, small stones.	Severe: slope, dusty, too sandy.
Corbett:				
8	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, dusty, small stones.	Severe: dusty.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Corbett:				
9	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, dusty, small stones.	Severe: slope, dusty.
[1]10:				
Corbett part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, large stones, too sandy.	Severe: slope, dusty.
Toiyabe part	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.
Cradlebaugh:				
11	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Dalzell:				
12	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Dalzell Variant:				
13	Moderate: dusty, percs slowly.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
Deven:				
[1]14:				
Deven part	Moderate: small stones, slope, percs slowly.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.
Rock outcrop part.				
[1]15:				
Deven part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Rock outcrop part.				
Fettic Variant:				
16	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
Glenbrook:				
17	Moderate: too sandy.	Moderate: too sandy.	Severe: slope, depth to rock.	Moderate: too sandy.
[1]18:				
Glenbrook part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope, too sandy.
Rock outcrop part.				
[1]19:				
Glenbrook part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Glenbrook:				
[1]19:				
Rock outcrop part.				
[1]20:				
Glenbrook part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop part.				
Greenbrae:				
21	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
22	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Haybourne:				
23	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.
24	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: too sandy, soil blowing.
25	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
26	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
27	Moderate: dusty, small stones.	Moderate: dusty, small stones.	Severe: small stones.	Moderate: dusty, small stones.
Histic Haplaquolls:				
28	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Hocar:				
[1]29:				
Hocar part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop part.				
[1]30:				
Hocar part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Rock outcrop part.				
Holbrook:				
31	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: small stones, dusty.
32	Moderate: slope, large stones, small stones.	Moderate: slope, small stones, dusty.	Severe: large stones, small stones, slope.	Moderate: small stones, large stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Holbrook Variant:				
[1]33:				
Holbrook Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop part.				
Incy:				
34	Severe: slope, too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: too sandy, soil blowing.
Indiano Variant:				
35	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Jubilee:				
36, 37	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness.
Kimmerling:				
38	Moderate: wetness, too clayey.	Moderate: wetness, too clayey.	Severe: wetness.	Moderate: wetness, too clayey.
Koontz:				
[1]39:				
Koontz part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, depth to rock, small stones.	Severe: slope.
Rock outcrop part.				
[1]40:				
Koontz part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
Sutro part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, large stones, small stones.
[1]41:				
Koontz part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, depth to rock, small stones.	Severe: slope.
Sutro part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
[1]42:				
Koontz part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones, dusty.
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Koontz:				
143:				
Koontz part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, depth to rock, small stones.	Severe: slope.
Sutro Variant part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
McFaul:				
44	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.
Mottsville:				
45	Moderate: soil blowing, too sandy.	Moderate: soil blowing, too sandy.	Severe: soil blowing.	Severe: soil blowing, too sandy.
Old Camp:				
146:				
Old Camp part	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: slope, large stones.
Holbrook Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
147:				
Old Camp part	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, small stones, large stones.	Moderate: large stones.
Rock outcrop part.				
148:				
Old Camp part	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: slope, large stones.
Rubble land part.				
Oppio:				
149:				
Oppio part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Nosrac part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Orizaba:				
50	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Prey:				
51	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, small stones.	Moderate: too sandy, soil blowing.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Prey:				
52	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
53	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Reno:				
54	Moderate: dusty, percs slowly.	Moderate: dusty.	Severe: slope, small stones.	Moderate: dusty.
55	Moderate: dusty, percs slowly.	Moderate: dusty.	Severe: small stones, slope.	Moderate: dusty.
Rock outcrop:				
[1]56:				
Rock outcrop part.				
Aldax Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Sagouspe:				
57	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.
Surprise:				
58	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones.	Moderate: dusty.
59	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
60	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
61	Moderate: dusty, small stones.	Moderate: dusty, small stones.	Severe: small stones.	Moderate: small stones, dusty.
Tarloc:				
62	Slight	Slight	Severe: slope.	Slight.
[1]63:				
Tarloc part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Glenbrook part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Tarloc Variant:				
64	Slight	Slight	Moderate: slope, depth to rock.	Slight.
Toem:				
[1]65:				
Toem part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, large stones, small stones.	Severe: slope, dusty, too sandy.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Toem:				
165:				
Rock outcrop part.				
166:				
Toem part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, large stones, small stones.	Severe: slope, dusty, too sandy.
Rock outcrop part.				
Toiyabe:				
167:				
Toiyabe part	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.
Corbett part	Severe: slope, dusty, too sandy.	Severe: slope, dusty, too sandy.	Severe: slope, dusty, small stones.	Severe: slope, dusty.
168:				
Toiyabe part	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.
Rock outcrop part.				
169:				
Toiyabe part	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, too sandy.	Severe: slope.
Rock outcrop part.				
Toll:				
70	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.
Urban land:				
71.				
Ursine Variant:				
72	Moderate: slope, dusty, small stones.	Moderate: slope, dusty, small stones.	Severe: slope, small stones.	Moderate: dusty, small stones.
Vamp:				
73, 74	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Vicee:				
175:				
Vicee part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Aldax Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
176:				
Vicee part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Vicee: [1]76: Aldax Variant part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Voltaire: 77	Moderate: wetness, percs slowly, too clayey.	Moderate: wetness, too clayey.	Severe: wetness.	Moderate: wetness, too clayey.
Xerta: [1]78: Xerta part	Severe: large stones, slope.	Severe: slope.	Severe: slope, large stones.	Severe: large stones.
Rock outcrop part.				

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Aldax:												
[1]1:												
Aldax part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Indiano part	Very poor.	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Aldax Variant:												
[1]2:												
Aldax Variant part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---
Rock outcrop part.												
Arkson:												
[1]3:												
Arkson part	Very poor.	Very poor.	Good	---	Good	Good	Very poor.	Very poor.	Very poor.	Fair	Very poor.	---
Rock outcrop part.												
Bishop:												
4	Fair	Fair	Poor	---	---	Very poor.	Good	Fair	Poor	---	Fair	Very poor.
Cagle:												
[1]5:												
Cagle part	Very poor.	Very poor.	Good	---	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Nosrac part	Very poor.	Very poor.	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Cagwin:												
6	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
[1]7:												
Cagwin part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Toem part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Corbett:												
8, 9	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
[1]10:												
Corbett part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Toiyabe part	Very poor.	Poor	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Cradlebaugh:												
11	Fair	Fair	Poor	---	---	Very poor.	Good	Good	Fair	---	Good	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Dalzell: 12	---	---	Very poor.	---	---	Very poor.	Poor	Very poor.	---	---	Poor	Very poor.
Dalzell Variant: 13	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Deven: [1]14: Deven part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop part.												
[1]15: Deven part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop part.												
Fettic Variant: 16	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Poor	Very poor.
Glenbrook: 17	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
[1]18: Glenbrook part	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop part.												
[1]19: Glenbrook part	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop part.												
[1]20: Glenbrook part	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop part.												
Greenbrae: 21, 22	Poor	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Haybourne: 23, 24, 25, 26, 27	Poor	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Histic Haplaquolls: 28	Very poor.	Poor	Poor	---	---	Very poor.	Good	Good	Poor	---	Good	Very poor.
Hocar: [1]29: Hocar part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Hocar:												
[1]29:												
Rock outcrop part.												
[1]30:												
Hocar part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---
Rock outcrop part.												
Holbrook:												
31	Very poor.	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
32	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Holbrook Variant:												
[1]33:												
Holbrook Variant part	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop part.												
Incy:												
34	Very poor.	Very poor.	Very poor.	---	---	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Indiano Variant:												
35	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Jubilee:												
36, 37	Fair	Fair	Good	---	---	Very poor.	Good	Good	Fair	---	Good	Poor.
Kimmerling:												
38	Fair	Fair	Fair	---	---	---	Good	Good	Fair	---	Good	Poor.
Koontz:												
[1]39:												
Koontz part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Rock outcrop part.												
[1]40:												
Koontz part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Sutro part	Very poor.	Very poor.	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
[1]41:												
Koontz part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Sutro part	Very poor.	Very poor.	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
[1]42:												
Koontz part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Koontz:												
[1]42:												
Sutro Variant part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
[1]43:												
Koontz part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Sutro Variant part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
McFaul:												
44	Poor	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Mottsville:												
45	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Old Camp:												
[1]46:												
Old Camp part	Very poor.	Very poor.	Fair	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Holbrook Variant part	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
[1]47:												
Old Camp part	Very poor.	Very poor.	Fair	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rock outcrop part.												
[1]48:												
Old Camp part	Very poor.	Very poor.	Fair	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rubble land part.												
Oppio:												
[1]49:												
Oppio part	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Nosrac part	Very poor.	Very poor.	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Orizaba:												
50	Very poor.	Very poor.	Very poor.	---	---	Very poor.	Poor	Good	Very poor.	---	Fair	Very poor.
Prey:												
51	Very poor.	Very poor.	Very poor.	---	---	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
52, 53	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Reno:												
54, 55	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Rock outcrop:												
[1]56:												
Rock outcrop part.												
Aldax Variant part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---
Sagouspe:												
57	Very poor.	Poor	Fair	---	---	Fair	Fair	Fair	Poor	---	Fair	Fair.
Surprise:												
58, 59, 60, 61	Poor	Poor	Fair	---	---	Good	Poor	Very poor.	---	---	---	Fair.
Tarloc:												
62	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
[1]63:												
Tarloc part	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Glenbrook part	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Tarloc Variant:												
64	Very poor.	Poor	Poor	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Toem:												
[1]65:												
Toem part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Rock outcrop part.												
[1]66:												
Toem part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Rock outcrop part.												
Toiyabe:												
[1]67:												
Toiyabe part	Very poor.	Poor	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Corbett part	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
[1]68:												
Toiyabe part	Very poor.	Poor	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Rock outcrop part.												
[1]69:												
Toiyabe part	Very poor.	Poor	Fair	---	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Rock outcrop part.												

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Toll: 70	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Urban land: 71.												
Ursine Variant: 72	Very poor.	Poor	Very poor.	---	---	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Vamp: 73	Poor	Poor	Poor	---	---	Poor	Poor	Poor	Poor	---	Poor	Poor.
74	Poor	Poor	Very poor.	---	---	Very poor.	Good	Good	Poor	---	Good	Very poor.
Vicee: [1]75: Vicee part	Very poor.	Very poor.	Good	---	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Good.
Aldax Variant part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---
[1]76: Vicee part	Very poor.	Very poor.	Good	---	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Aldax Variant part	Very poor.	Very poor.	Poor	---	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---
Voltaire: 77	Poor	Fair	Fair	---	---	Fair	Fair	Good	Fair	---	Fair	---
Xerta: [1]78: Xerta part	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop part.												

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol > means greater than. Absence of an entry indicates data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Aldax:											
1:											
Aldax part	0-14	Very stony fine sandy loam.	GM, SM	A-2	20-60	50-70	45-65	25-35	25-35	20-30	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Indiano part	0-13	Stony fine sandy loam.	SM	A-1, A-2	20-25	70-85	65-80	40-65	20-35	---	NP
	13-33	Clay loam, sandy clay loam, gravelly clay loam.	SC, CL, GC	A-2, A-6, A-7	0-15	65-95	60-85	50-85	30-70	30-45	15-25
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Aldax Variant:											
2:											
Aldax Variant part	0-5	Very stony very fine sandy loam.	GM	A-1	5-30	40-50	30-40	25-35	15-25	15-25	NP-5
	5-15	Very gravelly very fine sandy loam, very gravelly loam.	GM	A-1, A-2	5-20	45-55	35-45	30-40	20-30	15-25	NP-5
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Arkson:											
3:											
Arkson part	0-15	Stony very fine sandy loam.	GM, SM	A-2	5-15	60-70	50-60	45-55	25-35	15-25	NP-5
	15-40	Gravelly very fine sandy loam.	SM	A-2, A-4	5-15	65-75	55-65	50-60	30-40	15-25	NP-5
	40-60	Very gravelly very fine sandy loam.	GM	A-1	5-15	35-45	25-35	20-30	10-20	15-25	NP-5
Rock outcrop part.											
Bishop:											
4	0-28	Loam	ML	A-6, A-7	0	100	95-100	80-90	60-70	35-45	10-15
	28-60	Stratified sandy loam to clay loam.	SM	A-2, A-4	0-15	95-100	85-100	55-80	30-50	25-35	NP-10
Cagle:											
5:											
Cagle part	0-2	Very stony clay loam.	CL	A-6, A-7	25-35	85-95	80-90	75-85	55-65	35-45	15-25
	2-17	Gravelly clay	CL, CH	A-7	0-5	65-75	65-70	60-70	50-60	45-55	20-30
	17-30	Very gravelly clay, very cobbly clay loam.	GC	A-2	5-35	30-55	20-55	20-50	15-35	45-55	20-30
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Cagle:											
[15]:											
Nosrac part-----	0-9	Stony clay loam	GC	A-6	5-15	60-70	55-65	55-65	40-50	30-40	15-20
	9-34	Very gravelly clay loam.	GC	A-2	5-25	45-55	30-50	30-45	25-35	35-45	20-25
	34-60	Very gravelly loam.	GC	A-2, A-6	10-25	50-60	50-60	35-50	30-45	25-35	10-15
Cagwin:											
6-----------	0-7	Gravelly sand---	SM	A-1	0-5	65-90	55-75	25-40	10-15	---	NP
	7-40	Gravelly sand, gravelly coarse sand.	SP, SP-SM	A-1	0-5	65-85	50-75	20-35	0-10	---	NP
	40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[17]:											
Cagwin part-----	0-7	Gravelly sand---	SM	A-1	0-5	65-90	55-85	25-40	10-15	---	NP
	7-37	Gravelly sand, gravelly coarse sand.	SP, SP-SM	A-1	0-5	65-85	50-75	20-35	0-10	---	NP
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Toem part-------	0-9	Gravelly coarse sand.	SP-SM, SM	A-1	0-5	70-80	50-70	20-45	5-15	---	NP
	9-17	Gravelly coarse sand, gravelly loamy coarse sand, loamy coarse sand.	SP-SM, SM	A-1	0-5	70-100	50-80	20-45	5-15	---	NP
	17	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Corbett:											
8, 9----------	0-8	Gravelly sand---	SP-SM, SM	A-1	0-5	70-90	60-80	30-40	5-20	---	NP
	8-40	Loamy coarse sand, loamy sand, gravelly loamy coarse sand.	SP-SM, SM	A-1	0-20	80-90	65-80	20-40	5-20	---	NP
	40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[110]:											
Corbett part----	0-8	Stony loamy coarse sand.	SP-SM, SM	A-1	5-50	70-90	40-55	20-30	5-15	---	NP
	8-40	Loamy coarse sand, loamy sand, gravelly loamy coarse sand.	SP-SM, SM	A-1	0-20	80-90	65-80	20-40	5-20	---	NP
	40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Toiyabe part----	0-5	Stony loamy coarse sand.	SP-SM, SM	A-1	5-20	70-100	60-85	20-50	5-20	---	NP
	5-11	Loamy coarse sand, gravelly loamy coarse sand, coarse sand.	SP-SM, SM	A-1	0-15	70-100	60-85	20-50	5-20	---	NP
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Cradlebaugh:											
11	0-6	Loam	CL	A-6	0	100	100	90-100	60-75	30-40	10-20
	6-60	Stratified silty clay loam to fine sandy loam.	CL	A-6	0	100	100	85-95	60-75	30-40	10-20
Dalzell:											
12	0-10	Fine sandy loam	SM	A-4	0	100	100	70-80	40-50	---	NP
	10-20	Clay loam, loam	CL	A-6	0	100	100	90-100	70-80	30-40	15-25
	20-39	Stratified fine sandy loam to sandy clay loam.	SC	A-6	0	100	100	75-85	35-50	25-35	10-15
	39	Cemented	---	---	---	---	---	---	---	---	---
Dalzell Variant:											
13	0-10	Fine sandy loam	SM	A-4	0	95-100	85-95	70-80	40-50	20-30	20-30
	10-25	Clay, clay loam, gravelly clay.	CH, CL	A-7	0	90-100	65-85	60-80	55-70	45-60	25-35
	25-36	Loam	ML, CL-ML	A-4	0	90-100	80-90	70-80	60-70	20-30	NP-10
	36-60	Stratified loam to fine sandy loam.	ML, CL-ML	A-4	0	90-100	80-90	60-70	50-60	15-25	NP-10
Deven:											
^{1}14:											
Deven part	0-3	Very cobbly loam	GC	A-2	55-65	45-55	40-50	35-45	25-35	25-35	10-15
	3-9	Gravelly clay, clay loam.	CL, CH	A-6, A-7	0	80-100	70-90	65-80	60-75	35-60	20-30
	9	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
^{1}15:											
Deven part	0-5	Very cobbly loam	GC	A-2	55-65	45-55	40-50	35-45	25-35	25-35	10-15
	5-12	Gravelly clay, clay loam.	CL, CH	A-6, A-7	0	80-100	70-90	65-80	60-75	35-60	20-30
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Fettic Variant:											
16	0-5	Very fine sandy loam.	ML	A-4	0	95-100	95-100	85-95	50-65	20-30	NP-5
	5-10	Clay loam	CL	A-6, A-7	0	100	95-100	85-95	65-75	35-45	15-25
	10-36	Cemented	---	---	---	---	---	---	---	---	---
	36-60	Sandy clay loam	SC	A-6	0	100	95-100	75-85	35-50	30-35	15-20
Glenbrook:											
17	0-14	Gravelly loamy coarse sand.	SM	A-1	0-10	80-95	60-75	30-40	10-20	---	NP
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
^{1}18, ^{1}19, ^{1}20:											
Glenbrook part	0-14	Gravelly loamy coarse sand.	SM	A-1	0-10	80-95	60-75	30-40	10-20	---	NP
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Greenbrae:											
21	0-10	Gravelly sandy loam.	SM	A-1, A-2	0	85-95	60-75	35-50	20-30	15-25	NP-5
	10-30	Clay loam, sandy clay, sandy clay loam.	SC, CL	A-6	0	95-100	90-100	70-85	40-65	30-40	15-25
	30-60	Stratified coarse sand to loam.	SM	A-2	0	90-100	75-100	45-60	25-35	---	NP
22	0-4	Fine sandy loam	SM	A-2	0	95-100	90-100	55-75	20-35	---	NP
	4-24	Clay loam, sandy clay, sandy clay loam.	SC, CL	A-6	0	95-100	90-100	70-85	40-65	30-40	15-25
	24-60	Stratified coarse sand to loam.	SM	A-2	0	90-100	75-100	45-60	25-35	---	NP
Haybourne:											
23, 24	0-9	Sand	SP-SM, SM	A-1	0	90-100	75-95	40-50	5-15	---	NP
	9-25	Sandy loam, gravelly sandy loam.	SM	A-2	0	70-90	65-85	50-60	25-35	---	NP
	25-60	Stratified gravelly sandy loam to coarse sand.	SM	A-1, A-2	0	90-100	75-85	45-55	15-30	---	NP
25, 26	0-6	Sandy loam	SM	A-1, A-2	0	80-90	75-85	40-50	20-35	---	NP
	6-25	Sandy loam, gravelly sandy loam.	SM	A-2	0	70-90	65-85	50-60	25-35	---	NP
	25-60	Stratified gravelly sandy loam to coarse sand.	SM	A-1, A-2	0	90-100	75-85	45-55	15-30	---	NP
27	0-6	Gravelly sandy loam.	SM	A-1, A-2	0	70-80	65-75	40-50	20-30	---	NP
	6-25	Sandy loam, gravelly sandy loam.	SM	A-2	0	70-90	65-85	50-60	25-35	---	NP
	25-60	Stratified gravelly sandy loam to coarse sand.	SM	A-1, A-2	0	90-100	75-85	45-55	15-30	---	NP
Histic Haplaquolls:											
28	0-9	Peat	Pt	A-8	---	---	---	---	---	---	---
	9-60	Variable	---	---	---	---	---	---	---	---	---
Hocar:											
[1]29:											
Hocar part	0-7	Gravelly loam	GM	A-2, A-4	0-5	60-70	50-60	40-50	30-40	25-35	NP-5
	7-17	Very gravelly loam.	GM	A-1, A-2	0-5	40-50	20-40	20-30	10-20	25-35	NP-10
	17	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]30:											
Hocar part	0-3	Very gravelly loam.	GM	A-2	0-5	45-60	40-50	35-45	25-35	25-35	NP-5
	3-7	Very gravelly loam.	GM	A-1, A-2	0-5	40-50	20-40	20-30	10-20	25-35	NP-10
	7	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hocar:											
130:											
Rock outcrop part.											
Holbrook:											
31	0-9	Gravelly fine sandy loam.	SM	A-2	0-5	70-85	60-70	45-55	25-35	---	NP
	9-60	Stratified stony sand to very gravelly loam.	GM, SM	A-1, A-2	5-15	50-70	50-60	40-55	10-20	---	NP
32	0-12	Very stony fine sandy loam.	SM, GM	A-1, A-2	25-30	60-70	50-60	35-45	20-30	---	NP
	12-60	Stratified stony sand to very gravelly loam.	GM	A-1	5-15	55-60	40-55	25-40	10-20	---	NP
Holbrook Variant:											
133:											
Holbrook Variant part	0-8	Very stony fine sandy loam.	GM	A-1	25-30	35-45	25-35	20-30	10-20	20-30	NP-5
	8-24	Very gravelly fine sandy loam.	GM	A-1	10-15	30-40	20-30	15-25	10-15	20-30	NP-5
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Incy:											
34	0-60	Fine sand	SP-SM, SM	A-2, A-3	0	100	80-100	55-65	5-15	---	NP
Indiano Variant:											
35	0-11	Gravelly fine sandy loam.	SM	A-2	0-5	75-85	60-70	40-50	25-35	20-30	NP-5
	11-29	Gravelly clay loam.	GC	A-6	0	65-75	55-65	55-65	40-50	30-40	10-20
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Jubilee:											
36	0-20	Coarse sandy loam.	SM	A-2	0	95-100	85-100	50-60	25-35	15-25	NP-5
	20-60	Stratified coarse sand to sandy loam.	SM	A-1	0	95-100	85-100	40-50	10-20	---	NP
37	0-12	Sandy loam	SM	A-2	0	95-100	85-100	50-60	25-35	15-25	NP-5
	12-60	Stratified coarse sand to sandy loam.	SM	A-1	0	95-100	85-100	40-50	10-20	---	NP
Kimmerling:											
38	0-15	Silty clay loam	CL	A-6	0	100	100	90-100	70-90	30-40	10-20
	15-60	Stratified loam to silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-80	35-45	15-25
Koontz:											
139:											
Koontz part	0-9	Very gravelly loam.	GM	A-2, A-1	0	40-50	30-50	25-45	20-35	20-30	NP-5
	9-14	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-15	35-45	25-40	25-35	20-30	30-40	10-20
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Koontz:											
139:											
Rock outcrop part.											
140:											
Koontz part-----	0-9	Very gravelly loam.	GM	A-2, A-1	0	40-50	30-50	25-45	20-35	20-30	NP-5
	9-14	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-15	35-45	25-40	25-35	20-30	30-40	10-20
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sutro part------	0-6	Very stony loam	GM	A-2, A-4	20-30	55-65	45-55	35-45	30-40	15-25	NP-5
	6-24	Gravelly loam---	SM	A-4	5-20	70-80	55-65	45-55	35-45	15-25	NP-5
	24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
141:											
Koontz part-----	0-4	Extremely stony loam.	GM	A-1	20-35	35-45	25-35	20-30	15-25	20-30	NP-5
	4-9	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-15	35-45	25-40	25-35	20-30	30-40	10-20
	9	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sutro part------	0-6	Very stony loam	GM	A-2, A-4	20-30	55-65	45-55	35-45	30-40	15-25	NP-5
	6-24	Gravelly loam---	SM	A-4	5-20	70-80	55-65	45-55	35-45	15-25	NP-5
	24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
142, 143:											
Koontz part-----	0-9	Very stony loam	GM	A-1	20-35	35-45	25-35	20-30	15-25	20-30	NP-5
	9-14	Very gravelly clay loam, very gravelly loam.	GC	A-2	0-15	35-45	25-40	25-35	20-30	30-40	10-20
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sutro Variant part----------	0-9	Very stony loam	SM	A-4	25-30	75-85	65-75	55-65	40-50	20-25	NP-5
	9-51	Loam, gravelly loam.	SM, GM	A-4	0-5	60-80	55-80	50-70	35-50	20-25	NP-5
	51	Weathered bedrock.	---	---	---	---	---	---	---	---	---
McFaul:											
44----------	0-11	Sand----------	SP-SM, SM	A-1, A-2, A-3	0	95-100	85-100	45-55	5-20	---	NP
	11-28	Sandy loam, gravelly sandy loam, coarse sandy loam.	SC	A-2, A-6	0-5	90-100	70-95	50-60	25-45	25-30	10-15
	28-60	Stratified sand to sandy loam.	SP-SM, SM	A-1	0	95-100	85-100	30-40	5-15	---	NP
Mottsville:											
45----------	0-18	Loamy coarse sand.	SP-SM, SM	A-1	0	80-100	75-90	25-40	5-20	---	NP
	18-60	Stratified gravelly coarse sand to loamy sand.	SP-SM, SM	A-1	0	90-100	55-95	30-50	5-20	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Old Camp:											
146:											
Old Camp part---	0-5	Very stony loam	GM, GM-GC, SM, SM-SC	A-2	25-55	60-70	55-65	45-55	25-35	15-25	NP-10
	5-11	Very stony clay loam, very stony sandy clay loam, very stony loam.	GC, SC	A-2, A-6	35-50	65-70	55-65	45-55	30-40	30-40	15-25
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Holbrook Variant part---	0-8	Very stony fine sandy loam.	GM	A-1	25-30	35-45	25-35	20-30	10-20	20-30	NP-5
	8-24	Very gravelly fine sandy loam.	GM	A-1	10-15	30-40	20-30	15-25	10-15	20-30	NP-5
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
147:											
Old Camp part---	0-5	Very stony loam	GM, GM-GC, SM, SM-SC	A-2	25-55	60-70	55-65	45-55	25-35	15-25	NP-10
	5-11	Very stony clay loam, very stony sandy clay loam, very stony loam.	GC, SC	A-2, A-6	35-50	65-70	55-65	45-55	30-40	30-40	15-25
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
148:											
Old Camp part---	0-5	Very stony loam	GM, GM-GC, SM, SM-SC	A-2	25-55	60-70	55-65	45-55	25-35	15-25	NP-10
	5-11	Very stony clay loam, very stony sandy clay loam, very stony loam.	GC, SC	A-2, A-6	35-50	65-70	55-65	45-55	30-40	30-40	15-25
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land part.											
Oppio:											
149:											
Oppio part------	0-6	Very stony fine sandy loam.	SM	A-1, A-2	25-35	65-75	45-65	35-50	20-30	10-20	NP-5
	6-27	Gravelly clay---	GC	A-6, A-7	0-5	60-70	50-60	45-55	40-50	35-45	20-30
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Nosrac part-----	0-9	Stony clay loam	GC	A-6	5-15	60-70	55-65	55-65	40-50	30-40	15-20
	9-34	Very gravelly clay loam.	GC	A-2	0-10	45-55	30-50	30-45	25-35	35-45	20-25
	34-60	Gravelly loam---	GC	A-2, A-6	5-15	55-65	55-65	35-50	30-45	25-35	10-15
Orizaba:											
50---	0-9	Loam---	CL-ML, CL	A-4, A-6	0	100	100	85-95	65-75	25-35	5-15
	9-60	Stratified silty clay loam to sand.	CL	A-6	0	100	95-100	75-90	50-80	30-40	10-25

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Prey:											
51	0-13	Loamy sand	SM	A-1	0	80-95	70-90	35-50	10-20	---	NP
	13-30	Sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0	80-95	60-90	35-50	20-30	15-25	NP-5
	30-35	Cemented	---	---	---	---	---	---	---	---	---
	35-60	Loamy coarse sand.	SM	A-1	0	75-90	75-85	30-40	10-15	---	NP
52	0-3	Fine sandy loam	SM	A-2	0	75-85	75-80	55-65	25-35	15-25	NP-5
	3-33	Sandy loam	SM	A-2	0	90-100	80-90	50-60	25-35	25-35	NP-10
	33-36	Cemented	---	---	---	---	---	---	---	---	---
	36-60	Very gravelly loamy sand.	GP-GM	A-1	0-5	40-50	20-30	10-20	5-10	---	NP
53	0-3	Gravelly fine sandy loam.	SM	A-2	0	75-85	60-75	45-55	25-35	15-25	NP-5
	3-33	Sandy loam	SM	A-2	0	90-100	80-90	50-60	25-35	25-35	NP-10
	33-36	Cemented	---	---	---	---	---	---	---	---	---
	36-60	Very gravelly loamy sand.	GP-GM	A-1	0-5	40-50	20-30	10-20	5-10	---	NP
Reno:											
54	0-3	Cobbly fine sandy loam.	SM	A-1, A-2	15-30	65-85	60-80	50-65	20-35	15-25	NP-5
	3-24	Clay, sandy clay	SC, CH, CL	A-7	0-5	80-100	75-95	60-85	45-75	45-55	25-35
	24-29	Cemented	---	---	---	---	---	---	---	---	---
	29-60	Very gravelly loamy sand.	GP-GM, GM	A-1	5-10	30-55	20-50	15-30	5-15	---	NP
55	0-3	Gravelly clay loam.	GC, CL	A-6	0	65-75	60-75	55-70	45-55	35-40	15-20
	3-20	Clay, sandy clay	SC, CH, CL	A-7	0-5	80-100	75-95	60-85	45-75	45-55	25-35
	20-29	Cemented	---	---	---	---	---	---	---	---	---
	29-60	Very gravelly loamy sand.	GP-GM, GM	A-1	5-10	30-55	20-50	15-30	5-15	---	NP
Rock outcrop:											
56:											
Rock outcrop part.											
Aldax Variant part	0-5	Very stony very fine sandy loam.	GM	A-1	5-30	40-50	30-40	25-35	15-25	15-25	NP-5
	5-15	Very gravelly very fine sandy loam, very gravelly loam.	GM	A-1, A-2	5-20	45-55	35-45	30-40	20-30	15-25	NP-5
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sagouspe:											
57	0-10	Sand	SP-SM, SM	A-2, A-3	0	100	100	50-70	5-15	---	NP
	10-60	Stratified coarse sand to silt loam.	SM	A-2, A-4	0	100	100	50-75	15-40	10-20	NP-5
Surprise:											
58, 59	0-18	Coarse sandy loam.	SM	A-1, A-2	0	75-90	75-85	40-55	20-30	15-25	NP-5
	18-37	Stratified coarse sandy loam to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	15-25	20-30	NP-5
	37-60	Stratified loamy sand to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	10-25	15-25	NP-5

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Surprise:											
60	0-15	Sandy loam	SM	A-1, A-2	0	75-90	75-85	40-55	20-30	15-25	NP-5
	15-37	Stratified coarse sandy loam to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	15-25	20-30	NP-5
	37-60	Stratified loamy sand to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	10-25	15-25	NP-5
61	0-7	Gravelly sandy loam.	SM, SM-SC	A-1, A-2	0	65-80	60-75	40-55	20-30	15-25	NP-5
	7-40	Stratified coarse sandy loam to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	15-25	20-30	NP-5
	40-60	Stratified loamy sand to gravelly loam.	SM	A-1	0-5	70-90	50-85	30-50	10-25	15-25	NP-5
Tarloc:											
62	0-8	Gravelly coarse sandy loam.	SM	A-1, A-2	0-5	90-100	65-75	40-50	20-30	---	NP
	8-22	Gravelly coarse sandy loam, gravelly sandy loam.	SM-SC	A-2	0-5	80-90	55-65	35-45	15-25	15-25	5-10
	22	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]63:											
Tarloc part	0-8	Gravelly coarse sandy loam.	SM	A-1, A-2	0-5	90-100	65-75	40-50	20-30	---	NP
	8-22	Gravelly coarse sandy loam, gravelly sandy loam.	SM-SC	A-2	0-5	80-90	55-65	35-45	15-25	15-25	5-10
	22	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Glenbrook part	0-15	Gravelly loamy coarse sand.	SM	A-1	0-10	80-95	65-85	40-50	10-20	---	NP
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Tarloc Variant:											
64	0-17	Coarse sandy loam.	SM	A-1	0	95-100	75-80	40-50	15-25	---	NP
	17-32	Very gravelly coarse sandy loam.	SM-SC	A-2	0	75-85	35-50	20-30	10-20	20-25	5-10
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Toem:											
[1]65:											
Toem part	0-7	Bouldery coarse sand.	SP-SM, SM	A-1	10-25	85-100	60-75	20-45	5-15	---	NP
	7-17	Gravelly coarse sand, gravelly loamy coarse sand, loamy coarse sand.	SP-SM, SM	A-1	0-5	70-100	50-80	20-45	5-15	---	NP
	17	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Toem:											
[1]66:											
Toem part-------	0-7	Bouldery coarse sand.	SP-SM, SM	A-1	10-25	85-100	60-75	20-45	5-15	---	NP
	7-17	Gravelly coarse sand, gravelly loamy coarse sand, loamy coarse sand.	SP-SM, SM	A-1	0-5	70-100	50-80	20-45	5-15	---	NP
	17	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Toiyabe:											
[1]67:											
Toiyabe part-----	0-7	Stony loamy coarse sand.	SP-SM, SM	A-1	5-20	70-100	60-85	20-50	5-20	---	NP
	7-20	Loamy coarse sand, gravelly loamy coarse sand, coarse sand.	SP-SM, SM	A-1	0-15	70-100	60-85	20-50	5-20	---	NP
	20	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Corbett part-----	0-8	Gravelly sand---	SP-SM, SM	A-1	0-5	70-90	60-75	30-40	5-20	---	NP
	8-40	Loamy coarse sand, loamy sand, gravelly loamy coarse sand.	SP-SM, SM	A-1	0-20	80-90	65-80	20-40	5-20	---	NP
	40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]68:											
Toiyabe part-----	0-4	Stony loamy coarse sand.	SP-SM, SM	A-1	5-20	70-100	60-85	20-50	5-20	---	NP
	4-11	Loamy coarse sand, gravelly loamy coarse sand, coarse sand.	SP-SM, SM	A-1	0-15	70-100	60-85	20-50	5-20	---	NP
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]69:											
Toiyabe part-----	0-9	Loamy coarse sand.	SP-SM, SM	A-1	0	75-100	75-90	30-50	5-20	---	NP
	9-18	Loamy coarse sand, gravelly loamy coarse sand, coarse sand.	SP-SM, SM	A-1	0-15	70-100	60-85	20-50	5-20	---	NP
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Toll:											
70----------	0-15	Gravelly loamy sand.	SM	A-1	0	85-90	60-75	35-50	10-20	---	NP
	15-60	Loamy sand------	SM	A-2	0	95-100	95-100	50-60	15-25	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Urban land: 71.											
Ursine Variant: 72	0-7	Very gravelly fine sandy loam.	GM	A-1	0-5	50-60	40-50	30-40	15-25	15-25	NP-5
	7	Indurated	---	---	---	---	---	---	---	---	---
Vamp: 73	0-24	Fine sandy loam	SM	A-4	0	95-100	85-95	65-75	35-50	20-30	NP-5
	24-30	Cemented	---	---	---	---	---	---	---	---	---
	30-60	Stratified loamy sand to loam.	SM	A-2	0	90-100	80-90	50-60	25-35	15-25	NP-5
74	0-36	Fine sandy loam	SM, ML	A-4	0	95-100	85-100	75-90	45-65	20-30	NP-5
	36-42	Cemented	---	---	---	---	---	---	---	---	---
	42-60	Stratified loamy sand to silt loam.	SM, ML	A-4	0	90-100	85-100	60-80	35-60	15-30	NP-5
Vicee: [1]75: Vicee part	0-7	Very fine sandy loam.	SM	A-4	0-10	80-90	75-85	70-85	40-50	20-30	NP-5
	7-46	Very fine sandy loam, loam.	ML	A-4	0	95-100	85-95	75-85	50-60	20-30	NP-5
	46	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Aldax Variant part	0-5	Very stony very fine sandy loam.	GM	A-1	5-30	40-50	30-40	25-35	15-25	15-25	NP-5
	5-15	Very gravelly very fine sandy loam, very gravelly loam.	GM	A-1, A-2	5-20	45-55	35-45	30-40	20-30	15-25	NP-5
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]76: Vicee part	0-7	Stony very fine sandy loam.	SM	A-4	0-10	80-90	75-85	70-85	40-50	20-30	NP-5
	7-46	Very fine sandy loam, loam.	ML	A-4	0	95-100	85-95	75-85	50-60	20-30	NP-5
	46	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Aldax Variant part	0-5	Very stony very fine sandy loam.	GM	A-1	5-30	40-50	30-40	25-35	15-25	15-25	NP-5
	5-15	Very gravelly very fine sandy loam, very gravelly loam.	GM	A-1, A-2	5-20	45-55	35-45	30-40	20-30	15-25	NP-5
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Voltaire: 77	0-18	Silty clay loam	CL	A-6	0	100	100	85-100	70-85	30-40	10-20
	18-60	Stratified silty clay loam to loamy sand.	CL	A-6, A-7	0	100	100	90-100	75-90	35-45	15-25

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing--sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Xerta: [1]78:											
Xerta part-------	0-10	Extremely stony loam.	GC, SC	A-2, A-6	25-60	60-75	55-65	50-60	30-40	25-35	10-20
	10-23	Clay-------------	CH	A-7	0	90-100	80-90	70-80	60-70	50-60	30-40
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater then. The erosion tolerance factor (T) is for the entire profile. Absence of an entry indicates data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Aldax:											
[1]1:											
Aldax part	0-14	2.0-6.0	0.07-0.10	5.6-7.3	<2	Low	Low	Low	0.28	2	8
	14	---	---	---	---	---	---	---	---		
Indiano part	0-13	2.0-6.0	0.08-0.12	6.1-7.3	<2	Low	Low	Low	0.32	3	4
	13-33	0.2-0.6	0.16-0.19	6.1-7.3	<2	Moderate	Moderate	Low	0.28		
	33	---	---	---	---	---	---	---	---		
Aldax Variant:											
[1]2:											
Aldax Variant part	0-5	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24	1	8
	5-15	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24		
	15	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Arkson:											
[1]3:											
Arkson part	0-15	0.6-2.0	0.09-0.10	6.1-7.3	<2	Low	Moderate	Low	0.49	5	8
	15-40	0.6-2.0	0.10-0.11	6.6-7.3	<2	Low	Moderate	Low	0.49		
	40-60	0.6-2.0	0.05-0.07	6.6-7.3	<2	Low	Moderate	Low	0.43		
Rock outcrop part.											
Bishop:											
4	0-28	0.6-2.0	0.16-0.18	>8.4	4-8	Moderate	High	Moderate	---	---	5
	28-60	0.2-0.6	0.14-0.16	7.9-9.0	<4	Moderate	High	Moderate	---		
Cagle:											
[1]5:											
Cagle part	0-2	0.2-0.6	0.16-0.17	6.6-7.3	<2	Moderate	Moderate	Low	0.28	3	8
	2-17	0.06-0.2	0.13-0.15	6.6-7.3	<2	High	High	Low	0.24		
	17-30	0.06-0.2	0.07-0.09	6.6-7.3	<2	High	High	Low	0.24		
	30	---	---	---	---	---	---	---	---		
Nosrac part	0-9	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.28	5	8
	9-34	0.2-0.6	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.37		
	34-60	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.24		
Cagwin:											
6	0-7	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17	2	3
	7-40	6.0-20	0.04-0.05	5.1-6.5	<2	Low	Moderate	Moderate	0.17		
	40	---	---	---	---	---	---	---	---		
[1]7:											
Cagwin part	0-7	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17	2	3
	7-37	6.0-20	0.04-0.05	5.1-6.5	<2	Low	Moderate	Moderate	0.17		
	37	---	---	---	---	---	---	---	---		
Toem part	0-9	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17	1	3
	9-17	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17		
	17	---	---	---	---	---	---	---	---		
Corbett:											
8, 9	0-8	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17	2	3
	8-40	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17		
	40	---	---	---	---	---	---	---	---		
[1]10:											
Corbett part	0-8	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17	2	8
	8-40	6.0-20	0.05-0.07	5.1-6.5	<2	Low	Moderate	Moderate	0.17		
	40	---	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Corbett:											
[1]10:											
Toiyabe part----	0-5	6.0-20	0.06-0.08	6.1-7.3	<2	Low--------	Moderate	Moderate	0.10	1	3
	5-11	6.0-20	0.06-0.08	6.1-7.3	<2	Low--------	Moderate	Moderate	0.10		
	11	---	---	---	---	----------	----------	----------	---		
Cradlebaugh:											
11----------	0-6	0.6-2.0	0.18-0.20	>7.8	>16	Moderate	High------	High------	---	---	6
	6-60	0.2-0.6	0.18-0.20	>7.8	>2	Moderate	High------	High------	---		
Dalzell:											
12----------	0-10	2.0-6.0	0.13-0.15	7.4-8.4	4-8	Low--------	High------	Low-------	---	---	3
	10-20	0.2-0.6	0.19-0.21	8.5-9.0	8-16	Moderate	High------	Moderate	---		
	20-39	0.2-0.6	0.14-0.16	8.5-9.0	8-16	Moderate	High------	Moderate	---		
	39	---	---	---	---	----------	----------	----------	---		
Dalzell Variant:											
13----------	0-10	2.0-6.0	0.11-0.13	7.4-7.8	2-4	Low--------	High------	Low-------	0.32	5	3
	10-25	0.06-0.2	0.14-0.16	7.4-8.4	2-4	High-------	High------	Low-------	0.20		
	25-36	0.2-0.6	0.13-0.15	8.5-9.0	4-8	Low--------	High------	Low-------	0.37		
	36-60	0.6-6.0	0.13-0.15	8.5-9.0	2-4	Low--------	High------	Low-------	0.37		
Deven:											
[1]14:											
Deven part-------	0-3	0.6-2.0	0.08-0.10	7.4-8.4	<2	Moderate	Moderate	Low-------	0.32	1	8
	3-9	0.06-0.2	0.14-0.16	7.4-7.8	<2	High-------	High------	Low-------	0.28		
	9	---	---	---	---	----------	----------	----------	---		
Rock outcrop part.											
[1]15:											
Deven part-------	0-5	0.6-2.0	0.08-0.10	7.4-8.4	<2	Moderate	Moderate	Low-------	0.32	1	8
	5-12	0.06-0.2	0.14-0.16	7.4-7.8	<2	High-------	High------	Low-------	0.28		
	12	---	---	---	---	----------	----------	----------	---		
Rock outcrop part.											
Fettic Variant:											
16----------	0-5	0.6-2.0	0.15-0.17	7.9-9.0	>16	Low--------	High------	High------	0.32	2	5
	5-10	0.2-0.6	0.18-0.20	>8.4	>8	Moderate	High------	High------	0.28		
	10-36	---	---	---	---	----------	----------	----------	---		
	36-60	0.2-0.6	0.14-0.16	>8.4	>8	Moderate	High------	High------	0.20		
Glenbrook:											
17----------	0-14	6.0-20	0.05-0.07	6.1-7.3	<2	Low--------	Low-------	Moderate	0.10	2	2
	14	---	---	---	---	----------	----------	----------	---		
[1]18, [1]19, [1]20:											
Glenbrook part--	0-14	6.0-20	0.05-0.07	6.1-7.3	<2	Low--------	Low-------	Moderate	0.10	2	2
	14	---	---	---	---	----------	----------	----------	---		
Rock outcrop part.											
Greenbrae:											
21----------	0-10	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low--------	Moderate	Low-------	0.10	5	2
	10-30	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	High------	Low-------	0.24		
	30-60	2.0-6.0	0.10-0.13	6.6-7.8	<2	Low--------	High------	Low-------	0.15		
22----------	0-4	2.0-20	0.07-0.10	5.6-7.3	<2	Low--------	Moderate	Moderate	0.15	5	3
	4-24	0.06-0.6	0.15-0.18	6.1-7.3	<2	Moderate	High------	Low-------	0.24		
	24-60	2.0-6.0	0.10-0.13	6.6-7.8	<2	Low--------	High------	Low-------	0.15		
Haybourne:											
23, 24----------	0-9	6.0-20	0.07-0.08	6.6-7.3	<2	Low--------	Moderate	Low-------	0.15	5	2
	9-25	2.0-6.0	0.08-0.11	6.6-7.3	<2	Low--------	Moderate	Low-------	0.28		
	25-60	6.0-20	0.07-0.10	6.6-7.3	<2	Low--------	Moderate	Low-------	0.15		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Haybourne:											
25, 26, 27	0-6	2.0-6.0	0.08-0.11	6.6-7.3	<2	Low	Moderate	Low	0.24	5	3
	6-25	2.0-6.0	0.08-0.11	6.6-7.3	<2	Low	Moderate	Low	0.28		
	25-60	2.0-20	0.07-0.10	6.6-7.3	<2	Low	Moderate	Low	0.15		
Histic Haplaquolls:											
28	0-9	---	---	---	---	---	---	---	---	---	---
	9-60	---	---	---	---	---	---	---	---		
Hocar:											
[1]29:											
Hocar part	0-7	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low	High	Low	0.32	1	8
	7-17	0.6-2.0	0.06-0.10	7.9-8.4	<2	Low	High	Low	0.32		
	17	---	---	---	---	---	---	---	---		
Rock outcrop part.											
[1]30:											
Hocar part	0-3	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low	High	Low	0.32	1	8
	3-7	0.6-2.0	0.06-0.10	7.9-8.4	<2	Low	High	Low	0.32		
	7	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Holbrook:											
31	0-9	2.0-6.0	0.11-0.13	6.1-7.3	<2	Low	High	Low	0.24	5	4
	9-60	2.0-6.0	0.04-0.06	6.1-8.4	<2	Low	High	Low	0.15		
32	0-12	2.0-6.0	0.08-0.10	6.1-7.3	<2	Low	High	Low	0.28	3	1
	12-60	2.0-6.0	0.04-0.06	6.1-8.4	<2	Low	High	Low	0.15		
Holbrook Variant:											
[1]33:											
Holbrook Variant part	0-8	2.0-6.0	0.09-0.11	6.6-7.3	<2	Low	Moderate	Low	0.20	2	8
	8-24	2.0-6.0	0.09-0.11	6.6-7.3	<2	Low	Moderate	Low	0.20		
	24	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Incy:											
34	0-60	>20	0.05-0.07	6.6-7.3	<2	Low	Moderate	Low	0.10	5	1
Indiano Variant:											
35	0-11	2.0-6.0	0.08-0.09	7.4-7.8	<2	Low	High	Low	0.24	2	4
	11-29	0.2-0.6	0.13-0.15	6.6-7.3	<2	Moderate	High	Low	0.20		
	29	---	---	---	---	---	---	---	---		
Jubilee:											
36	0-20	2.0-6.0	0.13-0.15	6.1-7.3	<2	Low	Moderate	Low	0.15	5	3
	20-60	6.0-20	0.06-0.08	6.6-7.8	<2	Low	Moderate	Low	0.10		
37	0-12	2.0-6.0	0.13-0.15	6.1-7.3	<2	Low	Moderate	Low	0.15	5	3
	12-60	6.0-20	0.06-0.08	6.6-7.8	<2	Low	Moderate	Low	0.10		
Kimmerling:											
38	0-15	0.6-2.0	0.18-0.20	6.6-8.4	<8	Moderate	High	Low	---	---	8
	15-60	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	High	Low	---		
Koontz:											
[1]39:											
Koontz part	0-9	0.6-2.0	0.08-0.09	6.6-7.8	<2	Low	Moderate	Low	0.20	2	8
	9-14	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	Moderate	Low	0.17		
	14	---	---	---	---	---	---	---	---		
Rock outcrop part.											

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Koontz:											
140:											
Koontz part	0-9	0.6-2.0	0.08-0.09	6.6-7.8	<2	Low	Moderate	Low	0.20	2	8
	9-14	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	Moderate	Low	0.17		
	14	---	---	---	---	---	---	---	---		
Sutro part	0-6	0.6-2.0	0.11-0.12	6.6-7.3	<2	Low	Moderate	Low	0.24	3	8
	6-24	0.6-2.0	0.11-0.12	6.6-7.3	<2	Low	Moderate	Low	0.24		
	24	---	---	---	---	---	---	---	---		
141:											
Koontz part	0-4	0.6-2.0	0.08-0.09	6.6-7.8	<2	Low	Moderate	Low	0.20	2	8
	4-9	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	Moderate	Low	0.17		
	9	---	---	---	---	---	---	---	---		
Sutro part	0-6	0.6-2.0	0.11-0.12	6.6-7.3	<2	Low	Moderate	Low	0.24	3	8
	6-24	0.6-2.0	0.11-0.12	6.6-7.3	<2	Low	Moderate	Low	0.24		
	24	---	---	---	---	---	---	---	---		
142:											
Koontz part	0-9	0.6-2.0	0.08-0.09	6.6-7.8	<2	Low	Moderate	Low	0.20	2	8
	9-14	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	Moderate	Low	0.17		
	14	---	---	---	---	---	---	---	---		
Sutro Variant part	0-9	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low	Moderate	Low	0.32	3	8
	9-51	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low	Moderate	Low	0.32		
	51	---	---	---	---	---	---	---	---		
143:											
Koontz part	0-9	0.6-2.0	0.08-0.09	6.6-7.8	<2	Low	Moderate	Low	0.20	2	8
	9-14	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	Moderate	Low	0.17		
	14	---	---	---	---	---	---	---	---		
Sutro Variant part	0-9	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low	Moderate	Low	0.32	3	8
	9-51	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low	Moderate	Low	0.32		
	51	---	---	---	---	---	---	---	---		
McFaul:											
44	0-11	6.0-20	0.06-0.08	6.1-7.3	<2	Low	Moderate	Low	0.17	5	2
	11-28	0.2-2.0	0.10-0.14	6.6-7.3	<2	Low	Moderate	Low	0.17		
	28-60	6.0-20	0.06-0.08	6.6-7.8	<2	Low	High	Low	0.10		
Mottsville:											
45	0-18	>6.0	0.06-0.08	5.6-7.3	<2	Low	Low	Moderate	0.10	5	2
	18-60	>6.0	0.06-0.08	5.6-7.3	<2	Low	Moderate	Moderate	0.10		
Old Camp:											
146:											
Old Camp part	0-5	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low	Low	Low	0.17	1	8
	5-11	0.2-2.0	0.08-0.11	6.6-9.0	<2	Moderate	High	Low	0.15		
	11	---	---	---	---	---	---	---	---		
Holbrook Variant part	0-8	2.0-6.0	0.09-0.11	6.6-7.3	<2	Low	Moderate	Low	0.20	2	8
	8-24	2.0-6.0	0.09-0.11	6.6-7.3	<2	Low	Moderate	Low	0.20		
	24	---	---	---	---	---	---	---	---		
147:											
Old Camp part	0-5	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low	Low	Low	0.17	1	8
	5-11	0.2-2.0	0.08-0.11	6.6-9.0	<2	Moderate	High	Low	0.15		
	11	---	---	---	---	---	---	---	---		
Rock outcrop part.											
148:											
Old Camp part	0-5	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low	Low	Low	0.17	1	8
	5-11	0.2-2.0	0.08-0.11	6.6-9.0	<2	Moderate	High	Low	0.15		
	11	---	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Old Camp:											
148:											
Rubble land part.											
Oppio:											
149:											
Oppio part	0-6	2.0-6.0	0.07-0.09	7.4-7.8	<2	Low	High	Low	0.28	3	8
	6-27	0.06-0.2	0.14-0.16	7.4-7.8	<2	High	High	Moderate	0.17		
	27	---	---	---	---	---	---	---	---		
Nosrac part	0-9	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.28	5	8
	9-34	0.2-0.6	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.37		
	34-60	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	High	Low	0.24		
Orizaba:											
50	0-9	0.6-2.0	0.16-0.18	>9.0	>4	Moderate	High	High	---	---	5
	9-60	0.2-0.6	0.18-0.20	8.5-9.0	>4	Moderate	High	High	---		
Prey:											
51	0-13	6.0-20	0.06-0.07	6.1-7.3	<2	Low	Moderate	Low	0.17	3	2
	13-30	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	Moderate	Low	0.32		
	30-35	---	---	---	---	---	---	---	---		
	35-60	6.0-20	0.05-0.07	6.6-7.3	<2	Low	Moderate	Low	0.10		
52, 53	0-3	2.0-6.0	0.12-0.14	7.9-8.4	2-4	Low	High	Low	0.32	3	3
	3-33	2.0-6.0	0.11-0.13	7.9-8.4	2-4	Low	High	Low	0.32		
	33-36	---	---	---	---	---	---	---	---		
	36-60	6.0-20	0.05-0.07	7.9-8.4	<2	Low	High	Low	0.10		
Reno:											
54	0-3	2.0-6.0	0.08-0.12	6.1-7.3	<2	Low	Moderate	Low	0.17	2	4
	3-24	<0.06	0.14-0.16	6.1-7.8	<2	High	High	Low	0.24		
	24-29	---	---	---	---	---	---	---	---		
	29-60	>6.0	0.05-0.07	7.4-8.4	<4	Low	High	Low	0.15		
55	0-3	0.2-0.6	0.16-0.18	6.1-7.3	<2	Moderate	Moderate	Low	0.32	2	7
	3-20	<0.06	0.14-0.16	6.1-7.8	<2	High	High	Low	0.24		
	20-29	---	---	---	---	---	---	---	---		
	29-60	>6.0	0.05-0.07	7.4-8.4	<4	Low	High	Low	0.15		
Rock outcrop:											
156:											
Rock outcrop part.											
Aldax Variant part	0-5	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24	1	8
	5-15	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24		
	15	---	---	---	---	---	---	---	---		
Sagouspe:											
57	0-10	6.0-20	0.05-0.07	6.6-8.4	<2	Low	High	Moderate	---	---	1
	10-60	6.0-20	0.10-0.13	>7.8	<4	Low	High	Moderate	---		
Surprise:											
58, 59	0-18	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	Moderate	Low	0.20	5	3
	18-37	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low	Moderate	Low	0.28		
	37-60	2.0-6.0	0.08-0.10	6.1-7.3	<2	Low	Moderate	Low	0.28		
60	0-15	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	Moderate	Low	0.20	5	3
	15-37	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low	Moderate	Low	0.28		
	37-60	2.0-6.0	0.08-0.10	6.1-7.3	<2	Low	Moderate	Low	0.28		
61	0-7	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low	Moderate	Low	0.17	5	3
	7-40	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low	Moderate	Low	0.28		
	40-60	2.0-6.0	0.08-0.10	6.1-7.3	<2	Low	Moderate	Low	0.28		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Tarloc:											
62	0-8	2.0-6.0	0.09-0.10	6.1-7.3	<2	Low	Moderate	Low	0.24	3	4
	8-22	0.6-2.0	0.09-0.10	6.1-7.3	<2	Low	Moderate	Low	0.24		
	22	---	---	---	---	---	---	---	---		
163:											
Tarloc part	0-8	2.0-6.0	0.09-0.10	6.1-7.3	<2	Low	Moderate	Low	0.24	3	4
	8-22	0.6-2.0	0.09-0.10	6.1-7.3	<2	Low	Moderate	Low	0.24		
	22	---	---	---	---	---	---	---	---		
Glenbrook part	0-15	6.0-20	0.05-0.07	6.1-7.3	<2	Low	Low	Low	0.10	2	2
	15	---	---	---	---	---	---	---	---		
Tarloc Variant:											
64	0-17	2.0-6.0	0.09-0.10	6.6-7.3	<2	Low	Low	Low	0.20	2	3
	17-32	2.0-6.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.20		
	32	---	---	---	---	---	---	---	---		
Toem:											
165:											
Toem part	0-7	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17	1	8
	7-17	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17		
	17	---	---	---	---	---	---	---	---		
Rock outcrop part.											
166:											
Toem part	0-7	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17	1	8
	7-17	6.0-20	0.03-0.06	5.6-6.5	<2	Low	Moderate	Moderate	0.17		
	17	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Toiyabe:											
167:											
Toiyabe part	0-7	6.0-20	0.06-0.08	5.1-6.5	<2	Low	Moderate	High	0.10	1	3
	7-20	6.0-20	0.06-0.08	5.1-6.5	<2	Low	Moderate	High	0.10		
	20	---	---	---	---	---	---	---	---		
Corbett part	0-8	>6.0	0.05-0.07	5.1-6.5	<2	Low	Low	Moderate	0.17	2	3
	8-40	>6.0	0.05-0.07	5.1-6.5	<2	Low	Low	Moderate	0.17		
	40	---	---	---	---	---	---	---	---		
168:											
Toiyabe part	0-4	6.0-20	0.06-0.08	5.1-6.5	<2	Low	Moderate	High	0.10	1	3
	4-11	6.0-20	0.06-0.08	5.1-6.5	<2	Low	Moderate	High	0.10		
	11	---	---	---	---	---	---	---	---		
Rock outcrop part.											
169:											
Toiyabe part	0-9	6.0-20	0.06-0.08	5.6-6.5	<2	Low	Moderate	High	0.10	1	3
	9-18	6.0-20	0.06-0.08	5.1-6.5	<2	Low	Moderate	High	0.10		
	18	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Toll:											
70	0-15	6.0-20	0.04-0.06	6.6-7.3	<2	Low	Low	Low	0.10	5	2
	15-60	6.0-20	0.05-0.07	6.6-7.3	<2	Low	Low	Low	0.15		
Urban land:											
71.											
Ursine Variant:											
72	0-7	2.0-6.0	0.07-0.09	7.9-8.4	<2	Low	High	Low	0.32	1	4
	7	---	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Vamp:											
73	0-24	2.0-6.0	0.13-0.15	>8.4	4-8	Low	High	Moderate	---	---	3
	24-30	---	---	---	---	---	---	---	---		
	30-60	0.6-2.0	0.11-0.13	>8.4	4-8	Low	High	Moderate	---		
74	0-36	0.6-2.0	0.13-0.16	>7.8	>2	Low	High	High	---	---	3
	36-42	---	---	---	---	---	---	---	---		
	42-60	0.6-2.0	0.13-0.15	>7.8	>2	Low	High	High	---		
Vicee:											
[1]75:											
Vicee part	0-7	0.6-2.0	0.11-0.13	6.6-7.3	<2	Low	Moderate	Low	0.37	4	5
	7-46	0.6-2.0	0.11-0.13	6.6-7.3	<2	Low	Moderate	Low	0.37		
	46	---	---	---	---	---	---	---	---		
Aldax Variant part	0-5	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24	1	8
	5-15	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24		
	15	---	---	---	---	---	---	---	---		
[1]76:											
Vicee part	0-7	0.6-2.0	0.11-0.13	6.6-7.3	<2	Low	Moderate	Low	0.37	4	5
	7-46	0.6-2.0	0.11-0.13	6.6-7.3	<2	Low	Moderate	Low	0.37		
	46	---	---	---	---	---	---	---	---		
Aldax Variant part	0-5	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24	1	8
	5-15	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	Moderate	Low	0.24		
	15	---	---	---	---	---	---	---	---		
Voltaire:											
77	0-18	0.2-0.6	0.18-0.20	>8.4	>4	Moderate	High	Moderate	---	---	6
	18-60	0.06-0.2	0.18-0.20	>7.8	>4	Moderate	High	Moderate	---		
Xerta:											
[1]78:											
Xerta part	0-10	0.6-2.0	0.10-0.12	7.4-7.8	<2	Moderate	Moderate	Low	0.24	3	8
	10-23	0.06-0.2	0.12-0.14	7.4-8.4	<2	High	Moderate	Low	0.20		
	23	---	---	---	---	---	---	---	---		
Rock outcrop part.											

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 15.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means greater than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Aldax: [1]1:											
Aldax part	D	None	---	---	>6.0	---	---	10-20	Hard	---	---
Indiano part	C	None	---	---	>6.0	---	---	20-40	Hard	---	---
Aldax Variant: [1]2:											
Aldax Variant part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
Arkson: [1]3:											
Arkson part	B	None	---	---	>6.0	---	---	>60	---	---	---
Rock outcrop part.											
Bishop: 4	C	Common	Brief to long.	Feb-Jun	1.5-2.0	Apparent	Jan-Jul	>60	---	---	---
Cagle: [1]5:											
Cagle part	D	None	---	---	>6.0	---	---	20-40	Rippable	---	---
Nosrac part	C	None	---	---	>6.0	---	---	>60	---	---	---
Cagwin: 6	B	None	---	---	>6.0	---	---	20-40	Rippable	---	---
[1]7:											
Cagwin part	B	None	---	---	>6.0	---	---	20-40	Rippable	---	---
Toem part	C	None	---	---	>6.0	---	---	8-20	Rippable	---	---
Corbett: 8, 9	B	None	---	---	>6.0	---	---	24-40	Rippable	---	---
[1]10:											
Corbett part	B	None	---	---	>6.0	---	---	24-40	Rippable	---	---
Toiyabe part	C	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Cradlebaugh: 11	D	Common	Brief to long.	Mar-May	1.0-2.0	Apparent	Feb-Jun	>60	---	---	---
Dalzell: 12	C	Rare	---	---	>6.0	---	---	>60	---	30-40	Rippable
Dalzell Variant: 13	D	None	---	---	>6.0	---	---	>60	---	---	---

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Deven:											
[1]14:											
Deven part	D	None	---	---	>6.0	---	---	8-20	Hard	---	---
Rock outcrop part.											
[1]15:											
Deven part	D	None	---	---	>6.0	---	---	8-20	Hard	---	---
Rock outcrop part.											
Fettic Variant:											
16	D	None	---	---	>6.0	---	---	>60	---	10-20	Rippable
Glenbrook:											
17	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
[1]18:											
Glenbrook part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
[1]19:											
Glenbrook part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
[1]20:											
Glenbrook part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
Greenbrae:											
21, 22	B	None	---	---	>6.0	---	---	>60	---	---	---
Haybourne:											
23, 24, 25, 26, 27	B	Rare	---	---	>6.0	---	---	>60	---	---	---
Histic Haplaquolls:											
28	D	Frequent	Long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	>60	---	---	---
Hocar:											
[1]29:											
Hocar part	D	None	---	---	>6.0	---	---	7-20	Rippable	---	---
Rock outcrop part.											
[1]30:											
Hocar part	D	None	---	---	>6.0	---	---	7-20	Rippable	---	---
Rock outcrop part.											

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Holbrook: 31, 32	B	Rare	---	---	>6.0	---	---	>60	---	---	---
Holbrook Variant: [1]33: Holbrook Variant part	C	None	---	---	>6.0	---	---	20-40	Hard	---	---
Rock outcrop part.											
Incy: 34	A	None	---	---	>6.0	---	---	>60	---	---	---
Indiano Variant: 35	C	None	---	---	>6.0	---	---	24-40	Hard	---	---
Jubilee: 36, 37	C	Rare	---	---	1.0-2.0	Apparent	Dec-Jun	>60	---	---	---
Kimmerling: 38	D	Common	Long	Mar-May	0-2.0	Apparent	Mar-Jun	>60	---	---	---
Koontz: [1]39: Koontz part	D	None	---	---	>6.0	---	---	8-20	Ripable	---	---
Rock outcrop part.											
[1]40: Koontz part	D	None	---	---	>6.0	---	---	8-20	Ripable	---	---
Sutro part	C	None	---	---	>6.0	---	---	20-40	Ripable	---	---
[1]41: Koontz part	D	None	---	---	>6.0	---	---	8-20	Ripable	---	---
Sutro part	C	None	---	---	>6.0	---	---	20-40	Ripable	---	---
[1]42: Koontz part	D	None	---	---	>6.0	---	---	8-20	Ripable	---	---
Sutro Variant part	B	None	---	---	>6.0	---	---	40-60	Ripable	---	---
[1]43: Koontz part	D	None	---	---	>6.0	---	---	8-20	Ripable	---	---
Sutro Variant part	B	None	---	---	>6.0	---	---	40-60	Ripable	---	---
McFaul: 44	C	None	---	---	>6.0	---	---	>60	---	---	---
Mottsville: 45	A	None to rare	---	---	>6.0	---	---	>60	---	---	---
Old Camp: [1]46: Old Camp part	D	None	---	---	>6.0	---	---	10-20	Hard	---	---

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Old Camp:											
[1]46:											
Holbrook Variant part--	C	None	---	---	>6.0	---	---	20-40	Hard	---	---
[1]47:											
Old Camp part--	D	None	---	---	>6.0	---	---	10-20	Hard	---	---
Rock outcrop part.											
[1]48:											
Old Camp part--	D	None	---	---	>6.0	---	---	10-20	Hard	---	---
Rubble land part.											
Oppio:											
[1]49:											
Oppio part-----	D	None	---	---	>6.0	---	---	20-40	Hard	---	---
Nosrac part----	C	None	---	---	>6.0	---	---	>60	---	---	---
Orizaba:											
50----------	D	Rare to common.	Brief-----	Dec-Mar	2.5-3.5	Apparent	Nov-May	>60	---	---	---
Prey:											
51----------	C	None	---	---	>6.0	---	---	>60	---	26-38	Rippable
52, 53----------	C	Rare	---	---	>6.0	---	---	>60	---	20-40	Rippable
Reno:											
54, 55----------	D	None	---	---	>6.0	---	---	>60	---	20-40	Rippable
Rock outcrop:											
[1]56:											
Rock outcrop part.											
Aldax Variant part----------	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Sagouspe:											
57----------	C	Rare	---	---	3.0-5.0	Apparent	Feb-Aug	>60	---	---	---
Surprise:											
58, 59, 60, 61---	B	Rare	---	---	>6.0	---	---	>60	---	---	---
Tarloc:											
62----------	B	None	---	---	>6.0	---	---	20-40	Rippable	---	---
[1]63:											
Tarloc part-----	B	None	---	---	>6.0	---	---	20-40	Rippable	---	---
Glenbrook part-	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Tarloc Variant:											
64----------	B	None	---	---	>6.0	---	---	20-40	Rippable	---	---

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Toem:											
165:											
Toem part	C	None	---	---	>6.0	---	---	8-20	Rippable	---	---
Rock outcrop part.											
166:											
Toem part	C	None	---	---	>6.0	---	---	8-20	Rippable	---	---
Rock outcrop part.											
Toiyabe:											
167:											
Toiyabe part	C	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Corbett part	B	None	---	---	>6.0	---	---	24-40	Rippable	---	---
168:											
Toiyabe part	C	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
169:											
Toiyabe part	C	None	---	---	>6.0	---	---	10-20	Rippable	---	---
Rock outcrop part.											
Toll:											
70	A	None	---	---	>6.0	---	---	>60	---	---	---
Urban land:											
71.											
Ursine Variant:											
72	D	None	---	---	>6.0	---	---	>60	---	5-20	Rippable
Vamp:											
73	C	Rare	---	---	5.0-6.0	Apparent	Feb-May	>60	---	20-40	Rippable
74	C	Rare	---	---	3.0-5.0	Apparent	Feb-Jul	>60	---	20-40	Rippable
Vicee:											
175:											
Vicee part	B	None	---	---	>6.0	---	---	40-60	Rippable	---	---
Aldax Variant part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---
176:											
Vicee part	B	None	---	---	>6.0	---	---	40-60	Rippable	---	---
Aldax Variant part	D	None	---	---	>6.0	---	---	10-20	Rippable	---	---

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Voltaire:											
77	D	Rare	---	---	0-1.5	Apparent	Feb-May	>60	---	---	---
Xerta:											
[1]78:											
Xerta part	D	None	---	---	>6.0	---	---	20-40	Hard	---	---
Rock outcrop part.											

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 16.--ENGINEERING TEST DATA

[Tests performed by Nevada Department of Highways in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO)]

Soil name and location	Parent material	Depth	Horizon	[1]Percentage passing sieve--				Liquid limit	Plasticity index	Classification	
				No. 4	No. 10	No. 40	No. 200			[2]AASHTO	[3]Unified
		In						Pct			
Bishop loam, saline: 2,330 feet east and 1,100 feet north of southwest corner of sec. 16, T. 25 N., R. 20 E.	Mixed loamy alluvium	0-20	A1	100	100	88	58	27	[4]NP	A-4 (0)	ML
		28-40	C1	100	99	88	53	27	7	A-4 (2)	CL
Jubilee coarse sandy loam: 2,000 feet south and 600 feet west of northwest corner of sec. 9, T. 4 N., R. 20 E.	Mixed loamy alluvium	0-40	A1, C1	100	94	54	20	28	NP	A-2-4 (0)	SM
Kimmerling silty clay loam: 2,280 feet east and 100 feet north of southwest corner of sec. 16, T. 15 N., R. 20 E.	Mixed loamy alluvium	0-25	A1	100	100	96	81	47	22	A-7-6 (19)	CL
Orizaba loam, strongly saline-alkali: 2,600 feet east and 2,100 feet south of northwest corner of sec. 16, T. 15 N., R. 20 E.	Mixed loamy alluvium	0-16	A1	100	100	89	58	30	9	A-4 (3)	CL
		24-50	C2	100	94	68	34	21	3	A-2-4 (0)	SM

[1]Mechanical analyses according to the AASHTO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[2]Based on AASHTO Designation M 145-49.

[3]Based on the Unified soil classification system, D-2487-69.

[4]NP = Nonplastic.

TABLE 17.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a descriptio of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Aldax	Loamy-skeletal, mixed, mesic Lithic Haploxerolls
Aldax Variant	Loamy-skeletal, mixed, frigid, shallow Typic Haploxerolls
Arkson	Coarse-loamy, mixed Typic Cryoborolls
Bishop	Fine-loamy, mixed (calcareous), mesic Cumulic Haplaquolls
Cagle	Fine, montmorillonitic, mesic Aridic Argixerolls
Cagwin	Mixed Typic Cryopsamments
Corbett	Mixed, frigid Typic Xeropsamments
Cradlebaugh	Fine-loamy, mixed (calcareous), mesic Duric Haplaquolls
Dalzell	Fine-loamy, mixed, mesic Haploxerollic Nadurargids
Dalzell Variant	Fine, montmorillonitic, mesic Durixerollic Paleargids
Deven	Clayey, montmorillonitic, mesic Lithic Argixerolls
Fettic Variant	Loamy, mixed, mesic, shallow Natric Duraquolls
Glenbrook	Mixed, mesic, shallow Xeric Torripsamments
Greenbrae	Fine-loamy, mixed, mesic Xerollic Haplargids
Haybourne	Coarse-loamy, mixed, mesic Xerollic Camborthids
Histic Haplaquolls	Histic Haplaquolls
Hocar	Loamy-skeletal, mixed, mesic, shallow Calciorthidic Haploxerolls
Holbrook	Loamy-skeletal, mixed, mesic Aridic Haploxerolls
Holbrook Variant	Loamy-skeletal, mixed, mesic Xerollic Camborthids
Incy	Mixed, mesic Xeric Torripsamments
Indiano	Fine-loamy, mixed, mesic Aridic Argixerolls
Indiano Variant	Fine-loamy, mixed, mesic Xerollic Haplargids
Jubilee	Coarse-loamy, mixed, mesic Typic Haplaquolls
Kimmerling	Fine-loamy, mixed, mesic Cumulic Haplaquolls
Koontz	Loamy-skeletal, mixed, mesic, shallow Aridic Argixerolls
McFaul	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Xerollic Haplargids
Mottsville	Sandy, mixed, mesic Torripsammentic Haploxerolls
Nosrac	Loamy-skeletal, mixed, mesic Aridic Argixerolls
*Old Camp	Loamy-skeletal, mixed, mesic Lithic Xerollic Haplargids
*Oppio	Fine, montmorillonitic, mesic Xerollic Haplargids
Orizaba	Fine-loamy, mixed (calcareous), mesic Aeric Halaquepts
Prey	Coarse-loamy, mixed, mesic Haploxerollic Durargids
Reno	Fine, montmorillonitic, mesic Abruptic Xerollic Durargids
Sagouspe	Sandy, mixed, mesic Aquic Xerofluvents
Surprise	Coarse-loamy, mixed, mesic Aridic Haploxerolls
Sutro	Fine-loamy, mixed, mesic Aridic Haploxerolls
Sutro Variant	Coarse-loamy, mixed, mesic Aridic Haploxerolls
Tarloc	Coarse-loamy, mixed, mesic Xerollic Haplargids
Tarloc Variant	Loamy-skeletal, mixed, frigid Mollic Haploxeralfs
Toem	Mixed, shallow Typic Cryopsamments
Toiyabe	Mixed, frigid, shallow Typic Xeropsamments
Toll	Mixed, mesic Xeric Torripsamments
Ursine Variant	Loamy-skeketal, mixed, mesic, shallow Xerollic Durorthids
Vamp	Coarse-loamy, mixed, mesic Aquentic Durorthids
Vicee	Coarse-loamy, mixed, frigid Entic Haploxerolls
Voltaire	Fine-loamy, mixed (calcareous), mesic Fluvaquentic Haplaquolls
Xerta	Fine, montmorillonitic, mesic Aridic Durixerolls

☆ U.S. GOVERNMENT PRINTING OFFICE : 1979 O—245-120

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquires

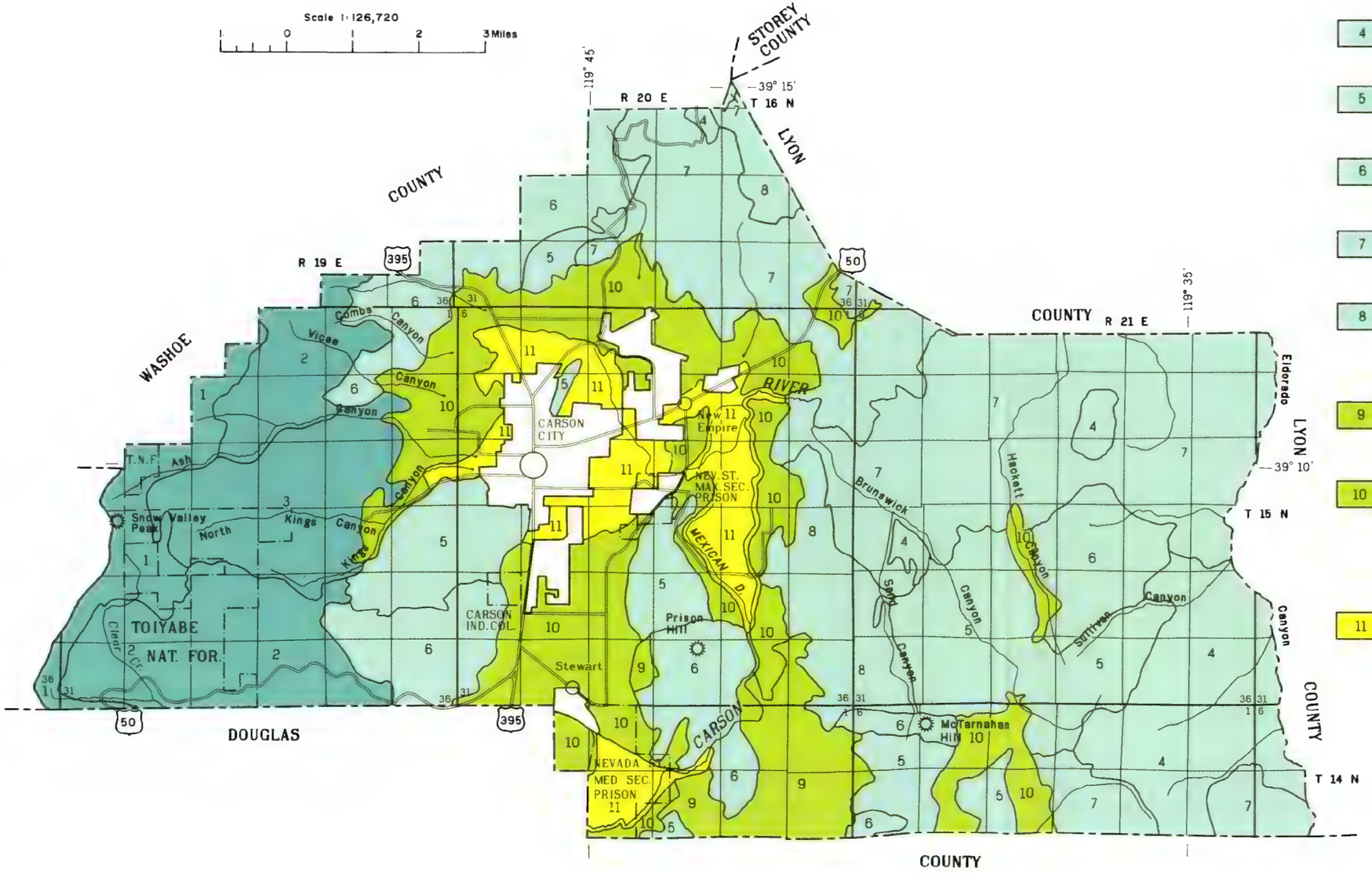
For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

N

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
U. S. DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT
BUREAU OF INDIAN AFFAIRS
NEVADA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

CARSON CITY AREA, NEVADA



MAP UNITS

STRONGLY SLOPING TO VERY STEEP SOILS OF THE SIERRA NEVADA

1 — Cagwin-Toem: Moderately steep to very steep, somewhat excessively drained and excessively drained, shallow and moderately deep soils that have a surface layer of gravelly sand and bouldery coarse sand

2 — Corbett-Toiyabe: Strongly sloping to very steep, somewhat excessively drained and excessively drained, shallow and moderately deep soils that have a surface layer of stony loamy coarse sand and gravelly sand

3 — Vicee-Arkson-Rock outcrop: Steep and very steep, well drained, deep soils that have a surface layer of very fine sandy loam and stony very fine sandy loam, and Rock outcrop

MODERATELY SLOPING TO VERY STEEP SOILS ON THE PINE NUT MOUNTAINS AND THE VIRGINIA RANGE

4 — Cagle-Nosrac: Moderately steep and steep, well drained, moderately deep and deep soils that have a surface layer of stony clay loam and very stony clay loam

5 — Koontz-Sutro: Moderately steep and steep, well drained, shallow and moderately deep soils that have a surface layer of very stony loam and very gravelly loam

6 — Glenbrook-Tarloc-Rock outcrop: Moderately sloping to very steep, well drained to somewhat excessively drained, shallow to moderately deep soils that have a surface layer of gravelly loamy coarse sand and gravelly coarse sandy loam, and Rock outcrop

7 — Deven-Oppio-Xerta: Moderately sloping to steep, well drained, shallow and moderately deep soils that have a surface layer of very cobbly loam, very stony fine sandy loam, and extremely stony loam

8 — Hocar-Rock outcrop: Moderately steep and steep, well drained, shallow soils that have a surface layer of gravelly loam, and Rock outcrop

NEARLY LEVEL TO MODERATELY STEEP SOILS ON BROAD ALLUVIAL FANS

9 — Incy-Toll: Nearly level to moderately steep, somewhat excessively drained and excessively drained, deep soils that have a surface layer of fine sand and gravelly loamy sand

10 — Surprise-Haybourne-Prey: Nearly level to strongly sloping, well drained and somewhat excessively drained, moderately deep and deep soils that have a surface layer of gravelly sandy loam, sandy loam, gravelly loamy sand, fine sandy loam, gravelly fine sandy loam, and coarse sandy loam

NEARLY LEVEL AND GENTLY SLOPING SOILS ON FLOOD PLAINS AND LOW ALLUVIAL FANS

11 — Urban land-Jubilee-Bishop: Nearly level and gently sloping, moderately well drained and poorly drained, moderately deep and deep soils that have a surface layer of coarse sandy loam, fine sandy loam, sandy loam, and loam

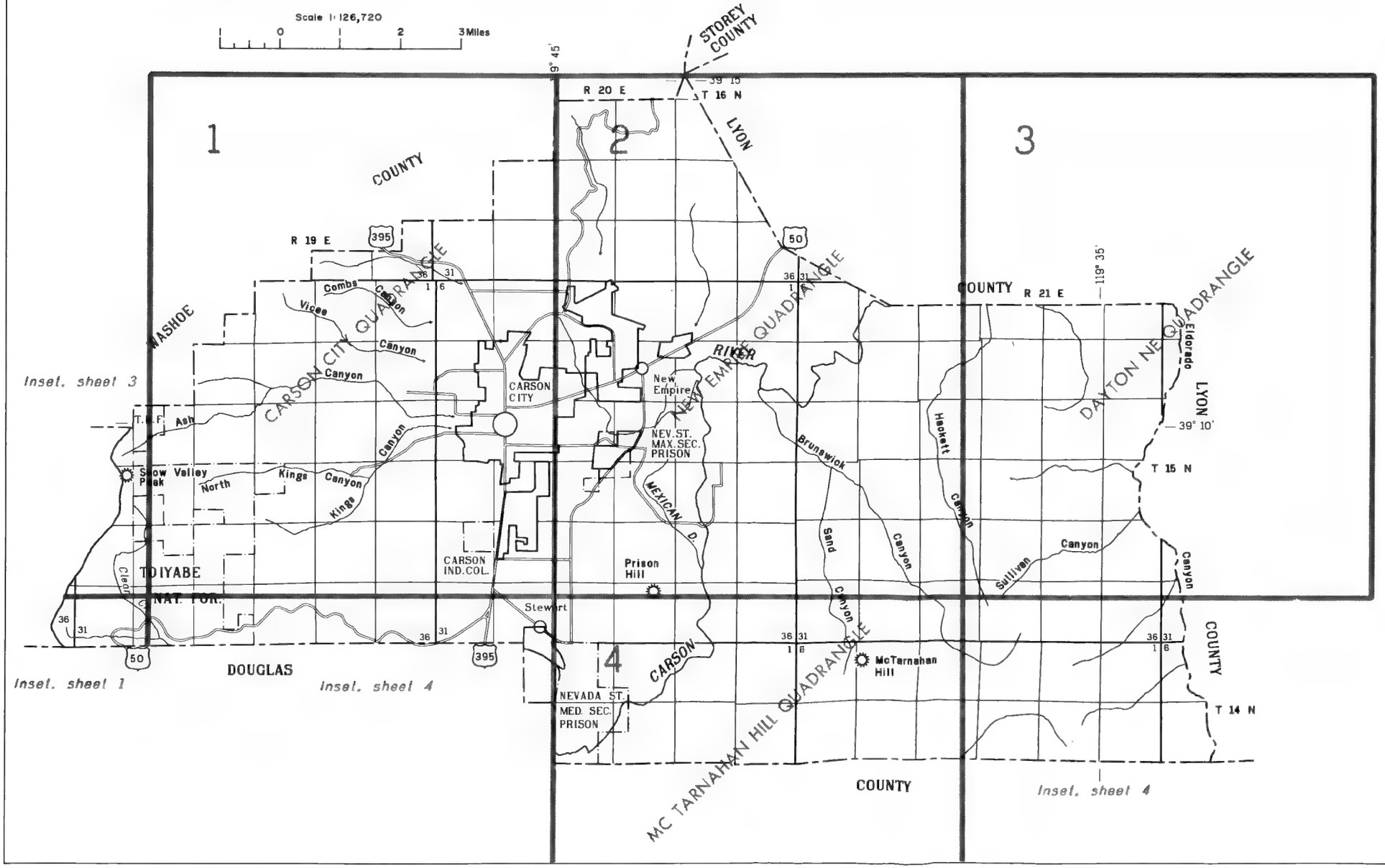
Compiled 1977

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

INDEX TO MAP SHEETS

CARSON CITY AREA, NEVADA



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

CARSON CITY AREA, NEVADA

U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS
BUREAU OF LAND MANAGEMENT AND U. S. FOREST SERVICE
UNIVERSITY OF NEVADA AGRICULTURAL EXPERIMENT STATION

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

SOIL LEGEND

A numerical legend is used. Symbols for broadly defined units are marked with an asterisk

SYMBOL	NAME
1	Aldax Indiano association
2	Aldax Variant Rock outcrop complex, 30 to 50 percent slopes
3	Arkson Rock outcrop complex, 30 to 50 percent slopes
4	Bishop loam, saline
5	Cagle Nosrac association*
6	Cagwin gravelly sand, 15 to 30 percent slopes
7	Cagwin-Toem complex, 30 to 75 percent slopes
8	Corbett gravelly sand, 8 to 15 percent slopes
9	Corbett gravelly sand, 30 to 50 percent slopes
10	Corbett-Toiyabe association
11	Cradlebaugh loam, strongly saline alkali
12	Dalzell fine sandy loam, deep water table
13	Dalzell Variant fine sandy loam, 0 to 4 percent slopes
14	Deven Rock outcrop complex, 4 to 15 percent slopes
15	Deven Rock outcrop complex, 15 to 50 percent slopes
16	Fettic Variant very fine sandy loam, 2 to 4 percent slopes
17	Glenbrook gravelly loamy coarse sand, 4 to 8 percent slopes
18	Glenbrook Rock outcrop complex, 8 to 30 percent slopes
19	Glenbrook Rock outcrop complex, 30 to 50 percent slopes
20	Glenbrook Rock outcrop complex, 50 to 75 percent slopes
21	Greenbrae gravelly sandy loam, 4 to 8 percent slopes
22	Greenbrae fine sandy loam, 0 to 2 percent slopes
23	Haybourne sand, 0 to 4 percent slopes
24	Haybourne sand, 8 to 15 percent slopes
25	Haybourne sandy loam, 0 to 2 percent slopes
26	Haybourne sandy loam, 4 to 8 percent slopes
27	Haybourne gravelly sandy loam, 2 to 4 percent slopes
28	Histic Haplaquolls, nearly level*
29	Hocar Rock outcrop complex, 15 to 50 percent slopes
30	Hocar-Rock outcrop complex, 15 to 30 percent slopes, eroded
31	Holbrook gravelly fine sandy loam, 4 to 8 percent slopes
32	Holbrook very stony fine sandy loam, 4 to 15 percent slopes
33	Holbrook Variant Rock outcrop complex, 30 to 75 percent slopes
34	Incy fine sand, 4 to 30 percent slopes
35	Indiano Variant gravelly fine sandy loam, 4 to 15 percent slopes
36	Jubilee coarse sandy loam, 0 to 2 percent slopes
37	Jubilee sandy loam, 2 to 4 percent slopes
38	Kimmerling silty clay loam
39	Koontz-Rock outcrop complex, 30 to 50 percent slopes
40	Koontz Sutro complex, 15 to 30 percent slopes
41	Koontz Sutro complex, 30 to 50 percent slopes
42	Koontz Sutro Variant association, moderately steep
43	Koontz-Sutro Variant association, steep
44	McFaul sand, 2 to 8 percent slopes
45	Mottsville loamy coarse sand, 2 to 4 percent slopes
46	Old Camp Holbrook Variant association*
47	Old Camp Rock outcrop complex, 8 to 15 percent slopes
48	Old Camp Rubble land complex, 15 to 30 percent slopes
49	Oppio Nosrac association*
50	Orizaba loam, saline alkali
51	Prey gravelly loamy sand, 0 to 4 percent slopes
52	Prey fine sandy loam, gravelly substratum, 4 to 8 percent slopes
53	Prey gravelly fine sandy loam, gravelly substratum, 8 to 15 percent slopes
54	Reno cobbly fine sandy loam, 4 to 8 percent slopes
55	Reno gravelly clay loam, 0 to 4 percent slopes
56	Rock outcrop Aldax Variant complex, 50 to 75 percent slopes
57	Sagouspe sand
58	Surprise coarse sandy loam, 2 to 4 percent slopes
59	Surprise coarse sandy loam, 4 to 8 percent slopes
60	Surprise sandy loam, 8 to 15 percent slopes
61	Surprise gravelly sandy loam, 0 to 2 percent slopes
62	Tarloc gravelly coarse sandy loam, 4 to 8 percent slopes
63	Tarloc Glenbrook association
64	Tarloc Variant coarse sandy loam, 2 to 8 percent slopes
65	Toem Rock outcrop complex, 30 to 50 percent slopes
66	Toem Rock outcrop complex, 50 to 75 percent slopes
67	Toiyabe Corbett complex, 30 to 50 percent slopes
68	Toiyabe-Rock outcrop complex, 30 to 50 percent slopes
69	Toiyabe Rock outcrop complex, 50 to 75 percent slopes
70	Toll gravelly loamy sand, 0 to 15 percent slopes
71	Urban land
72	Ursine Variant very gravelly fine sandy loam, 8 to 15 percent slopes
73	Vamp fine sandy loam, drained
74	Vamp fine sandy loam, slightly saline alkali
75	Vicee-Aldax Variant complex, 30 to 50 percent slopes
76	Vicee Aldax Variant complex, 50 to 75 percent slopes
77	Voltaire silty clay loam, saline
78	Xerta Rock outcrop complex, 4 to 30 percent slopes

* Broadly defined units

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (57)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water)
- Intermittent (int)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA, FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

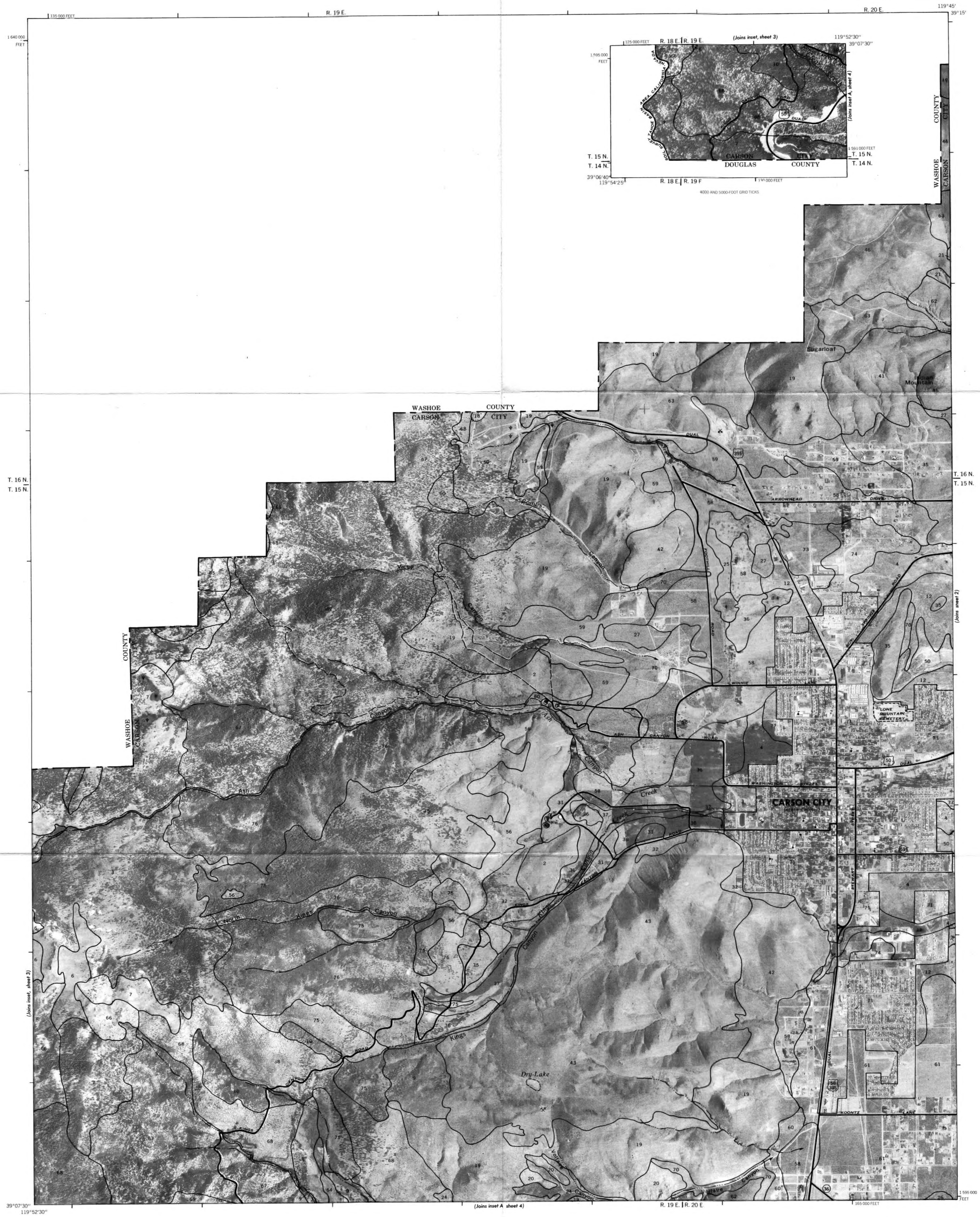
MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

N.P. 5-76

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 1
CARSON CITY AREA, NEVADA
(CARSON CITY QUADRANGLE AND
PART OF GLENBROOK QUADRANGLE)



This soil survey was compiled in 1977 by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

CARSON CITY AREA, NEVADA NO. 1

Orthophotobase compiled from 1975 and 1976 aerial photography by the U.S. Department of The Interior, Geological Survey. Planimetric detail obtained from 7½ minute series maps. 10,000-foot grid based on state coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 2
CARSON CITY AREA, NEVADA
(NEW EMPIRE QUADRANGLE)

R. 20 E. R. 21 E.

119°37'30"
205 000 FEET

39°15'

1 635 000 FEET

T. 16 N.
T. 15 N.

STOREY COUNTY

WASHOE COUNTY
CARSON CITY

LYON COUNTY
CARSON CITY

VIRGINIA RANGE

CARSON AIRPORT

New Empire

CARSON CITY
(state capitol)

Sewage Disposal

Nevada State Prison

CARSON RIVER

Brunswick Canyon

Sand Hill

Hackett Canyon

PRISON HILL

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 4)

1 595 000 FEET

39°07'30"
119°45'

170 000 FEET

This soil survey was compiled in 1977 by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

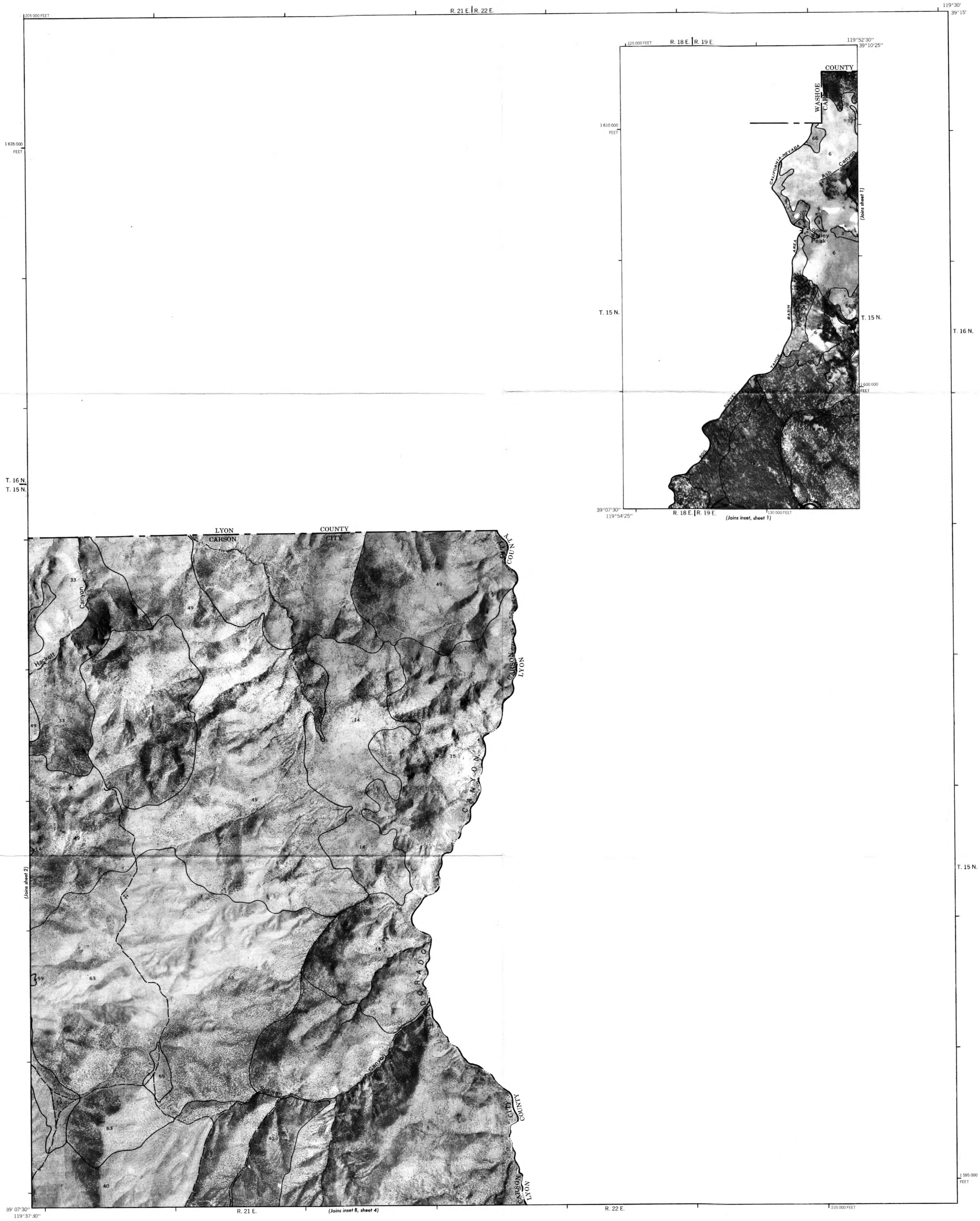
1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

Orthophotobase compiled from 1975 and 1976 aerial photography by the U.S. Department of The Interior, Geological Survey. Planimetric detail obtained from 7½ minute series maps 10,000-foot grid based on state coordinate system.

CARSON CITY AREA, NEVADA NO. 2

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 3
CARSON CITY AREA, NEVADA
(DAYTON N.E. QUADRANGLE AND
PART OF MARLETTE LAKE QUADRANGLE)



This soil survey was compiled in 1977 by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

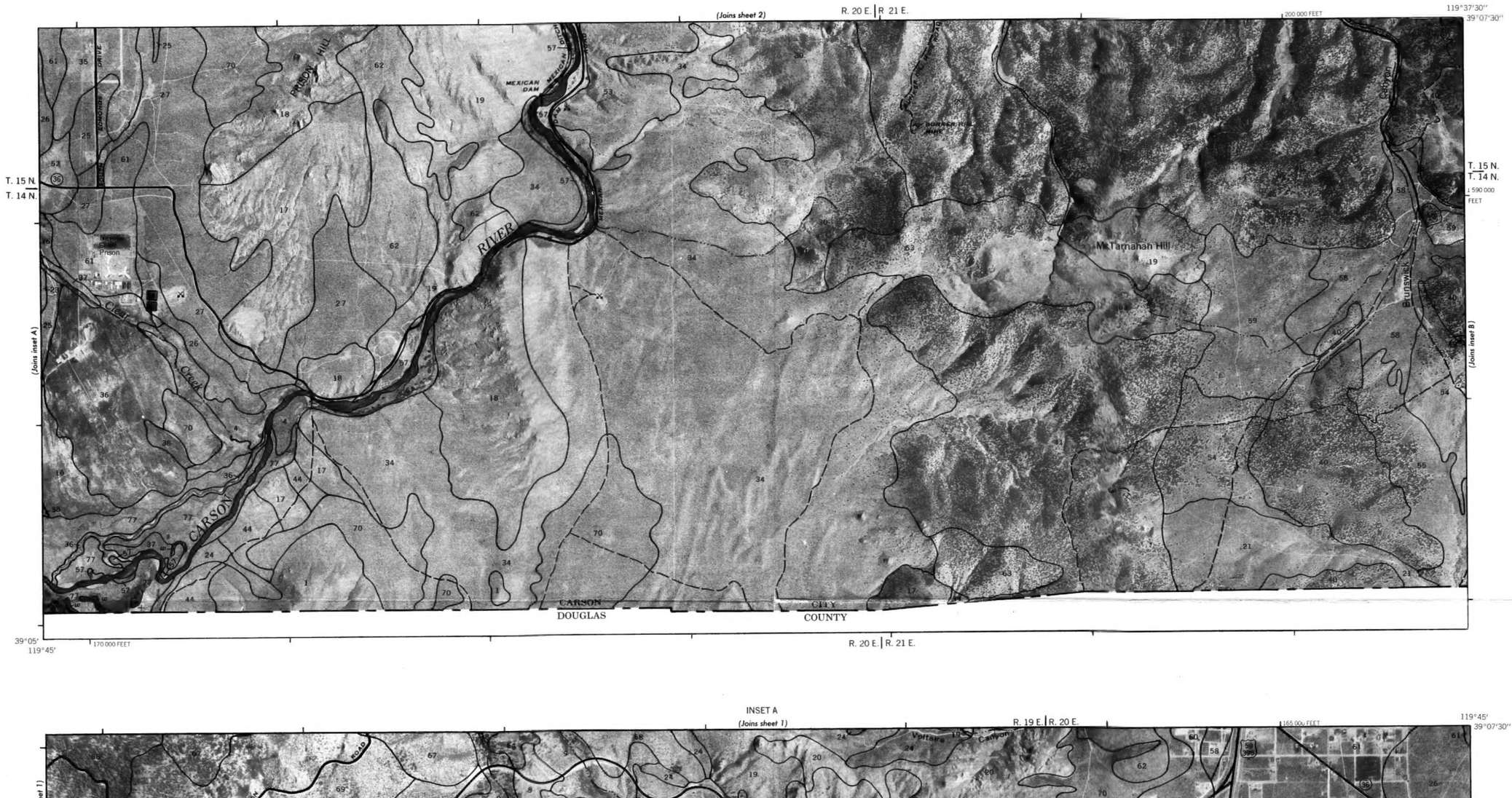
1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 Scale 1:24000 5000 10000 Feet

Orthophotobase compiled from 1975 and 1976 aerial photography by the U.S. Department of The Interior, Geological Survey. Planimetric detail obtained from 7½ minute series maps. 10,000-foot grid based on state coordinate system

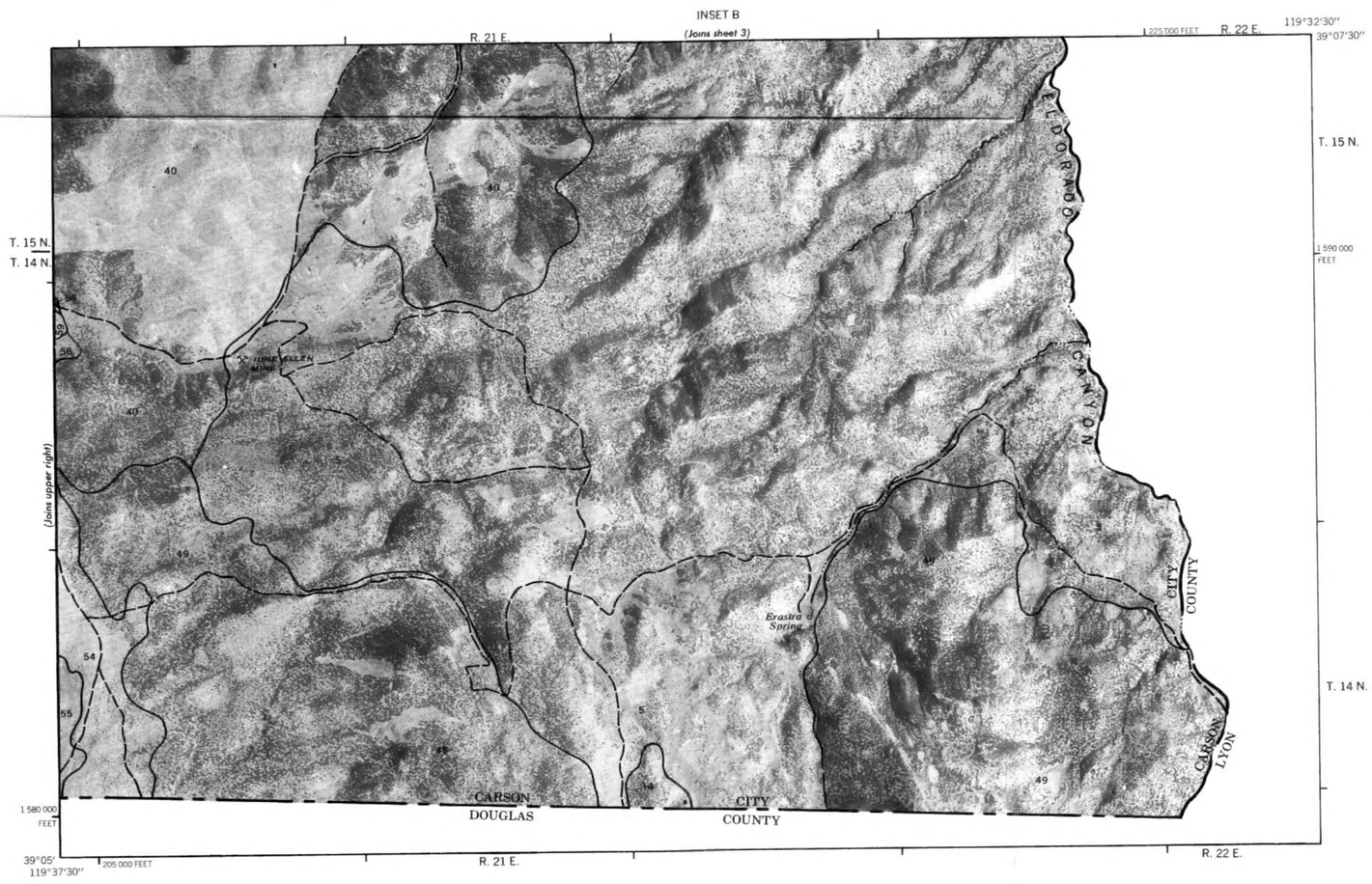
CARSON CITY AREA, NEVADA NO. 3

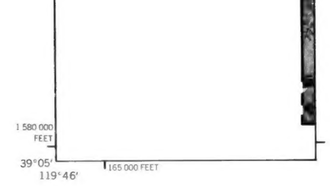
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 4
CARSON CITY AREA, NEVADA
(McTARNAHAN HILL QUADRANGLE AND
PART OF GENOA AND DAYTON S.E. QUADRANGLES)



4000 AND 5000-FOOT GRID TICKS





This soil survey was compiled in 1977 by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 Scale 1:24000 5000 10000 Feet

Orthophotobase compiled from 1975 and 1976 aerial photography by the U.S. Department of The Interior, Geological Survey. Planimetric detail obtained from 7½ minute series maps. 10,000-foot grid based on state coordinate system.

CARSON CITY AREA, NEVADA NO. 4